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ABSTRACT

Recognizing the importance of health care during the perinatal period, the topic for this issue of "Children in the Tropics" is prenatal development; this issue is intended for health educators for use in educating their clients about prenatal development, health care during pregnancy, labor and delivery, and the needs of the mother and neonate during the perinatal period. The sections are: (1) "Gestation," focusing on considerations for health care providers, psychological, social, and environment risk factors; (2) "Intrauterine Development," presenting a day-by-day account of organ formation and development, functions of the placenta, the amniotic fluid, methods of intrauterine stimulation, medication, drugs, and maternal diet; (3) "Surveillance of Pregnancy," detailing health care procedures and the impact of the expectant mother's family and social environment; (4) "Pregnancy and Childbirth: A Psychological and Physiological Experience," describing psychological needs during pregnancy, the role of the health team, physical and psychological aspects of childbirth, examination of the neonate, identifying gestational age, and breastfeeding; and (5) "The Health Team--An Interdisciplinary Team," presenting the educational needs of expectant mothers and their families and health care procedures during the perinatal period. An appendix describes the effects of specific drugs taken at various points during prenatal development, during labor, or while breastfeeding. (KB)

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STEPS IN INTRAUTERINE DEVELOPMENT

1996 - N° 225

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Very soon thereafter, the ICC began to direct its efforts mainly toward Third World children and their families, with emphasis on training and refresher training of personnel working with them not only in medical and paramedical capacities, but also in social, educational and administrative positions. The desire for greater efficiency has led it to work increasingly with trainers and to concentrate its efforts on the methodological and educational aspects of programmes.

The ICC is also engaged in an attempt to further action-studies on some aspects of the life and health of children and their family, particularly in the fields of growth, nutrition, planned parenthood and the control of communicable and nutrition-related diseases, as well as in education and the needs of handicapped and disadvantaged children, and of those otherwise in difficulty.

The ICC possesses a documentation centre which has been collecting, classifying and communicating information on children and their surroundings for over 40 years. Over the past decade, the centre has developed the Robert Debré Data Base (BIRD) : with over 135,000 references, it is able to respond to written requests for bibliographic research information. The ICC also puts out a BIRD CD-ROM, which is an annually updated version of the base, consultable on any IBM-compatible personal computer with a CD-ROM drive. It also publishes the proceedings of seminars, as well as educational documents.

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A PERIODICAL : CHILDREN IN THE TROPICS

Thanks to this journal, readers may update their knowledge and skills in the fields of health, education, diet and development as well as planning, programme administration and methods for research and action. It is an educational tool offering university teachers and trainers the possibility of improving their teaching programmes.

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It publishes 5 to 6 issues a year, in three languages. Issues are 40 to 80 pages long, depending on the subject broached.

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STEPS IN INTRAUTERINE DEVELOPMENT

H. GENSINI BARRA
AND COLLABORATORS

1996 - N° 225

STEPS IN INTRAUTERINE DEVELOPMENT

PREFACE 4

INTRODUCTION 8

GESTATION

The pre-gestation period 11

Risk factors 12
- Risk factors of psychological origin 14
- Social risk factors 14
- Environmental risk factors 15

INTRAUTERINE DEVELOPMENT

Organ formation 16
The placenta 20
The amniotic fluid 21
Intrauterine stimulation 21
Attitudes towards medication and drugs 23
The pregnant woman's diet 23

SURVEILLANCE OF PREGNANCY

Surveillance programme 25

Tools for surveillance 25
- Advice for pregnant women 27
- The expectant mother, her family and social environment 28

PREGNANCY AND CHILDBIRTH : A PSYCHOLOGICAL AND PHYSIOLOGICAL EXPERIENCE

Pregnancy 34

Birth 39
- Examining the newborn baby 41
- The mother and the post-partum period 42
- Breast-feeding 42

THE HEALTH TEAM - AN INTERDISCIPLINARY TEAM

Education and pregnancy 46
Laboratory tests and educational themes 50

CONCLUSION 52

APPENDIX

Pharmaceuticals and pregnancy 54

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PREFACE

This paper is the fruit of a series of experiences that are briefly described here so that readers will understand the process. It was in 1979, during a training session for health workers led by Doctors Gensini and Gavito for the Cauca Valley health department, in Colombia, on the theme of infant development, that the need for a complete explanation of child development starting with gestation became evident. A number of diagrams illustrating these phases were drawn up and tested at the Cali, Colombia, Foundation for Child Development between 1979 and 1986.

A survey of popular knowledge about gestation in various population groups, conducted in collaboration with the Institute of the Spanish agency Manos Unidas between 1988 and 1989, contributed some more sociological findings.

Between 1989 and 1991, a number of contacts were established with national and international agencies, to obtain financial support for the elaboration and diffusion of this material on the phases of intrauterine development. The idea was to develop this activity simultaneously in three Latin American countries (Brazil, Colombia and Mexico). None of the institutions responded positively, and the organizers experienced temporary discouragement.

The Colombian experiment began at last, in 1992, in the Cauca region, with the support of the Restrepo Barco Foundation (Bogotá, Colombia) and the combined contributions of the Cali Foundation for Higher Education (FES), the regional health department and the Cali municipal health secretariat, coordinated by the Foundation for Child Development.

The test material, elaborated by Dr. Gensini, as well as the user's handbook for personnel, were enriched by suggestions by a large group of the country's specialists. Between February 1993 and August 1994, the material was experimented in 49 health centres and hospitals, with encouraging results. The project was therefore presented at a workshop/seminar on «Wholesome Growth and Development», the objective of which was to create a conceptual framework based on knowledge, experience and thought, in Colombia. This was achieved under the auspices of the PAHO, WHO, the Colombian Institute for Family Welfare (ICBF), the Colombian Social Security, Italian aid and the Antonio Restrepo Barco Foundation. Dr. Luz Myriam Claros Giraldo, who coordinated the field work experiments and evaluation of the material within the Foundation for Child Development, presented her results.

7

At the same time, between 1993 and 1995, Dr. Gensini and Laura Correa, psychologist, in collaboration with a team including professionals and pregnant women, reflected on the psychological and social aspects of pregnancy in the Málaga (Spain) region. All of the material on the phases of child development, including the educational handbook, was revised on the basis of the findings uncovered in Colombia between July and August 1995.

Last, the International Children's Centre took part in the work by advancing some suggestions and arranging the report for publication in «Children in the Tropics».

Many people with responsibilities of all sorts participated in this long process. Although they cannot all be listed here, I do wish to extend my thanks to them for their participation, contributions and support.

Who is this dossier for ?

This material is primarily designed for the men and women who are working in education for health, for young people/future parents, health promoters, mothers in community programmes, administrative personnel and volunteers in the health field, working in urban neighbourhoods and rural areas, and above all, for children and parents, who are at the heart of these efforts.

Pathways

The purpose of this educational material is to present an integrated, didactic view of the gestation process, as experienced by both mother and child, on the basis of the links that exist between child development prior to birth and surveillance of the mother's pregnancy, delivery and the period immediately following childbirth for both mother and neonate. It is our hope that it will help to prevent many life-threatening risks for mothers and children and many health hazards for children during the forthcoming decade.

Hugo Gensini

EDITOR'S NOTE

In 1979, WHO advanced the following definitions and recommendations.

Gestational age : the duration of gestation is measured from the first day of the last menstruation period. Gestational age is expressed in days or full weeks (for example, a birth occurring between 280 and 286 days after the last menses is considered as occurring at 40 weeks).

A premature is a neonate born before the 37th week (less than 259 days).

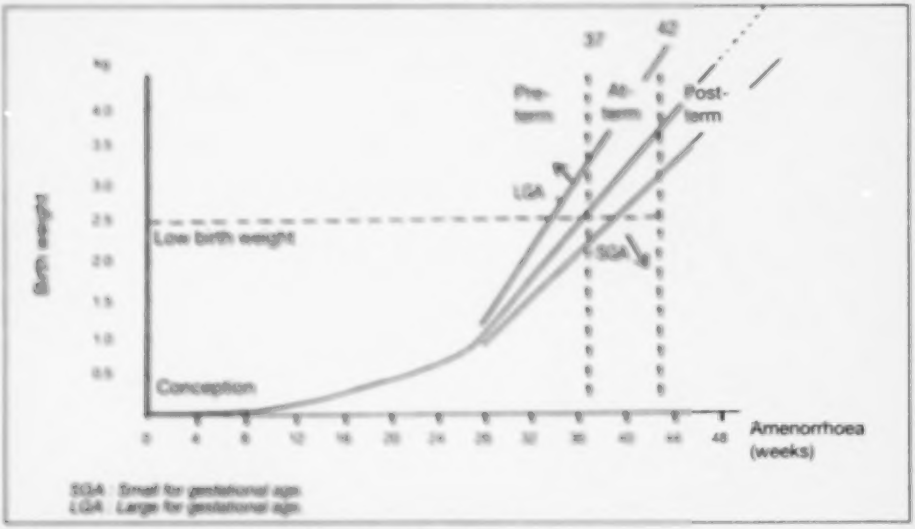
A neonate is born at term when the birth takes place between the 37th and the 42nd weeks (between 259 and 293 days).

A post-mature is a neonate born after a gestation period of 42 weeks or more (at least 294 days).

Birth weight (BW) : must be measured during the first hour of life, before the post-natal weight loss.

Low birth weight (LBW) : a birth weight under 2,500 g, strictly, irrespective of the term.

An infant is small for gestational age (SGA) when the birth weight is below a certain cut-off point, derived from reference data, with respect to the term. The most frequently used cut-off is the 10th percentile, but the 3rd percentile or the mean minus two standard deviations may also be used. Conversely, a baby is large for gestational age when its birth weight exceeds a given cut-off, be it the 90th or 97th percentile, or the mean plus two standard deviations.



Definitions relating to birth weight and gestational age.

Source : According to Dunn P.M. The search for perinatal definitions and standards. Acta Paediatr Scand Suppl. 1985 ; n° 319 : 7-16.

The figure shown here presents these definitions. The terms SGA and LGA do not necessarily involve the notion of abnormal growth connected with some pathological process : they refer to a deviation of the child's growth in comparison with the general trend.

Intrauterine growth retardation (IUGR) suggests the occurrence of a pathological process in the course of intrauterine life, resulting in diminished foetal growth. Strictly speaking, the anthropometric measurements at birth of a small for gestational age baby and a baby with IUGR are exactly the same. At that point, no criterion independent of weight is available to define IUGR. SGA infants are therefore usually regarded as having suffered from IUGR, including all full-term infants born weighing less than 2,500 g. Actually, however, SGA babies may exist well beyond the 2,500 g cut-off point. The study of the long-term outcome and the post-natal growth of small for gestational age babies shows that they do not form a homogeneous group.

INTRODUCTION

In this document the same chart is shown at regular intervals ; it serves as a tool for monitoring the mother/child dyad, and for the education of health workers and parents.

The chart shows the different phases of gestation, the main physiological landmarks for the mother, the embryo and the foetus, the major risks and activities to be developed. It is gradually completed to show each of the periods in increasing detail.

A health team that is intent on watching over the gestation period should be well aware of the events preceding that period, those that occur during it and those that follow it, in their specificity. Both mother and child must be given attention.

Before gestation

Throughout any pregnancy, the health personnel should monitor the maternal and foetal aspects simultaneously.

During gestation

Personnel should pay attention to the past history of the parents, the maturation of the gametes and fertilization.

Four periods may be distinguished : the ovular period (15 days), the embryonic period (80 days), the early foetal period (80 - 120 days) and the late foetal period (180 - 280 days).

After gestation

A number of elements should receive attention : childbirth and the post partum period, at-term or premature delivery, low birth weight, post-maturity, the neonate, the aftermaths of delivery for the mother.

11

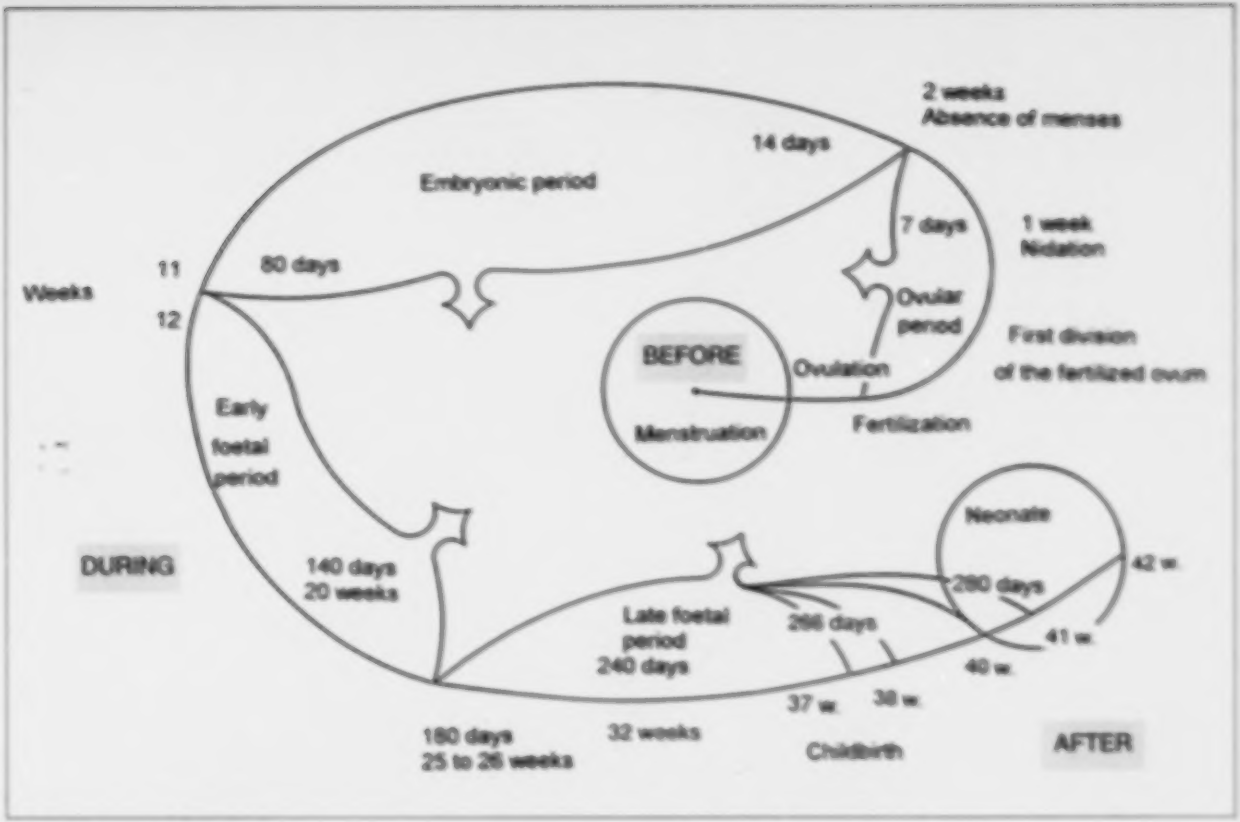


Figure 1 : Phases of gestation.

The following aspects will be analysed in the chapters below :

Child development
Day, week, period
Evolution of weight and height
Chronological development of various structures
Acquisition of organic functions
Evaluation of degree of development
Ability to communicate with mother
Intrauterine stimulation

Gestation
Signs and symptoms in each period
Warning signs connected with each period
The mother and her environment
Advice
Occupational and cultural risks
Sex life

Risks for the mother, embryo and foetus
Natural, pathological and/or iatrogenic
Pathology affecting the ovum, embryo or foetus
Neonatal pathology

The health team : its role
In surveillance of gestation, delivery and its aftermaths
Monitoring child development
Diagnosis and treatment of any problems
Education for health

GESTATION

The period immediately preceding the beginning of gestation is extremely important and must be given attention, especially with respect to family and social factors. Three aspects must be analysed, in this respect : the parents, the family and the social environment.

The parents
Age, consanguinity, parity level, family heredity
Type of work
Is the child desired (by the father, the mother, both) ?
History of domestic violence or desertion
Is the couple dependent on their family ?
Lifestyle and living conditions, schooling

The family
Relations within the couple
Family well-knit or disintegrated
Composition of the mother's and father's family
First child or one more child
Replaces a deceased child or one lost during a previous pregnancy
Fruit of a rape or sexual abuse (incest)
Mother single or deserted by her husband
Violence or abuse within the family

Social environment
Urban or rural, migration, drifting population
Crisis situation : economic, political or religious crisis, war, emigration, displaced persons

THE PRE-GESTATION PERIOD

During this period, a number of elements must be considered.

Current diseases or disorders : hypertension, diabetes, heart disease, epilepsy, chronic kidney disease, sexually transmissible diseases, anaemia, malnutrition, mental illness, cancer

Interbirth interval

At-risk behaviour : smoking, drinking, drug abuse, self-medication

Occupational hazards : heavy work load, contamination

Pregnancy monitored or not : other biological risks (pelvis, spinal column). Weight gain. Allergies. Breast pathology. Other problems (herpes, malaria, drepanocytosis, genital infections,

lupus, thrombophlebitis, Rhesus sensitivity, gravidic toxaemia, malnutrition)

Age and height of the mother

Emotional problems

RISK FACTORS

Detection of some factors susceptible of entailing perinatal consequences such as perinatal death, small birth weight, neonatal pathology or death and maternal morbidity or mortality is essential (1).

Quality of life
Single mother
Little schooling
Smoking
Low income
Insufficient antenatal monitoring

Growth retardation
Age < 19 or > 35 years
History of abortion
Mother's initial weight < 45 kg
Low weight gain

Biological factors
History :
of a stillborn child
of low birth weight
of early neonatal death
of multiple pregnancy

Factors during delivery
Induced breach delivery
Caesarean section, forceps delivery

Maternal pathology
Haemorrhaging during the first or last three months
Risk of premature delivery
Pregnancy-induced high blood pressure
Chronic hypertension - Eclampsia
Premature rupture of the membranes
Acute or chronic maternal infection
Heart disease - Urinary infection
Diabetes, pre-existing or pregnancy-linked
Hydramnios - Phlebitis
Biliary stasis - Vomiting linked to pregnancy
STD, HIV or AIDS

Neonatal factors
Low birth weight
Perinatal asphyxiation
Prematurity, respiratory distress
Intracerebral bleeding
Acute or chronic infection
Congenital anomaly
Central nervous system pathology

(1) These indicators are drawn from the analysis of statistics from Cauca (relative risk in 35,000 cases).

In other words, special attention must be paid to pregnant women with the following characteristics :

Under age 19 or over age 35

Height < 1 m 40

Weight < 45 kg or > 90 kg

Interbirth interval less than 2 years

Low weight gain during pregnancy

Single mother, unsupported by family

Aggressive family, social or occupational environment

Insufficient financial resources

Low educational level

Undesired child

Obstetrical and neonatal history of :

- toxaemia - multiple pregnancies (twins)
- multiparity (more than 5 pregnancies)
- miscarriage, abortion or premature delivery - hydramnios
- children with congenital anomalies
- stillborn or early neonatal death
- low birth weight baby
- caesarean section
- diabetes - heart disease
- inadequate weight/height ratio

According to statistics, 8 out of 10 women take some medication during pregnancy, and 3 of them take unprescribed medication, 4 out of 10 women drink alcoholic beverages, 2 out of 10 smoke, 1 out of 10 takes tranquillizers and 2 out of 100 are regular consumers of stimulant drugs.

This is an added reason for educational efforts to prevent risks at both the individual and the societal levels.

RISK FACTORS OF PSYCHOLOGICAL ORIGIN

Women at great psychological risk, who require individual psychological help, mostly belong to the following categories :

- desertion (women who have been emotionally or physically deserted)
- rapes
- prostitution
- previous miscarriage or induced abortion
- alcohol or drug abuse
- venereal disease
- serious financial trouble
- daughter of a woman who is an alcohol or child abuser, or who had aborted or abandoned a child
- daughter of psychopaths (criminal offenders, imprisoned) or of parents with a psychiatric history
- problems within the couple

It is important to watch for certain risk factors, so that the expectant mother may be given psychological help :

- the expectant mother is an adolescent
- she is over age 35 for first pregnancy
- she desires neither the pregnancy nor the child
- she is in a permanent state of anxiety and/or anguish
- she shows exaggerated concern about and attention to changes in her body
- she relates poorly, emotionally, with the child in her womb
- she finds it difficult to conceive of talking to the baby in her womb
- has conflicting feelings about hearing, feeling or seeing the baby
- she has a depressive, schizoid or autistic personality
- difficulties within the couple - changes in behaviour, unfaithfulness, rejection, hostility, mutual indifference
- she or husband has appetite problems - no appetite or voraciousness
- either she or husband has recurrent nightmares

SOCIAL RISK FACTORS

Some social factors may cause problems, or constitute limits to health-promotion activities. These risk factors may have a cumulative effect over a period of time, and the conjunction of several such elements may produce potentially serious at-risk situations. If the influence of a social factor is particularly intense, it may affect even the strongest individuals.

We have identified the following social risk factors as susceptible of affecting gestation :

- absence of a stable couple
- broken home
- single parent family with financial and parental responsibilities not shared
- permanent conflicts in the home
- solitude
- weak social support network
- resources inadequate or lacking
- occupational instability or unemployment
- homeless
- home in poor condition (promiscuity, physical deterioration, too smelly or noisy, contamination)
- expulsion, immigration
- unexpectedly violent situations, war or armed conflict

ENVIRONMENTAL RISK FACTORS

During the prenatal and early post-natal period, the baby is exposed to environmental factors that are often underestimated or even overlooked, since they are very ordinary or unrecognized. Gradual urbanization, with its great masses of people, the development of industry and of the chemical industry in particular, entail risks that did not seem terribly important even a few years ago.

Pregnancy is a waitful time, full of illusions and questionings about the future of life on Earth. People must all take position within their immediate environment, and according to their own possibilities, to protect children's future by actively fighting to provide them with less contaminated air and water, fewer chemicals - fertilizers, weed-killers, insecticides - in the land, and healthier food.

INTRAUTERINE DEVELOPMENT

Intrauterine growth and development is a complex, rapid process. It starts with a cell weighing about 0.000020 grammes, and arrives at delivery of a neonate weighing 150,000,000 times that figure. Height growth is equally spectacular : with an increase from 0.01 cm to 50 cm, it is multiplied by 5,000*.

ORGAN FORMATION

Hour 0	Fertilization-fusion of the nuclei of the ovum and the spermatozoon
30 hours	First cell division of the fertilized ovum, two cells are formed
2.5 days	Eight cells
4 days	Morula
7 days	Blastula or blastocyte, nidation takes place in the endometrium through the action of enzymes that create a recess in which the blastula is implanted
14 days	Implantation/formation of a primitive placenta from the shaggy chorion
15 days	Absence of menstruation
16 days	Development of «breaches» in the endometrium, as the mother's participation in the embryo's placental circulation
17 days	Beginning of organogenesis : formation of the various organs, up to the 55th day
18 days	Early stage of the beating, contracting heart-tube. Development of the neural plate
19 days	Folds in the neural plate
20 days	The thyroid gland begins to develop
21 days	Foetal placental circulation
22 days	The heart begins to beat, folds in the neural tube merge
23 days	The eyes and ears begin to develop
24 days	The neural tube is in place. The intestine, digestive tube and amniotic fluid communicate
26 days	Buds of upper limbs
27 days	Auditory orifices, cutaneous plate (derm)
28 days	Auditory vesicles, beginning of the development of the trunk muscles, beginning of definitive placenta formation and of exchanges between maternal and foetal blood

* *Remember that the criteria for relatively low risk are a birth weight > 2,500 for a gestation period comprised between 37 and 42 weeks. Children whose weight is too high for their term are therefore excluded.*

29 days	Buds of lower limbs
30 days	Crystalline lenses and optic cupulae
31 days	Primitive mouth, separation between the oesophagus and the trachea, the thyroid gland is structured
32 days	Paddle hands
33 days	Aorta visible, division of the auricles
34 days	Digital furrows visible on beginnings of hands
35 days	Paddle feet. The liver begins to produce red blood cells
36 days	Confluence of the nasal and buccal cavities
37 days	The retinal pigment of the eye becomes visible, formation of the crystalline lens
38 days	Formation of the upper lip. The intestinal flexurae form a hernia in the umbilical cord
39 days	Formation of the pavilion of the ear
40 days	The arms bend at the elbow, palmed fingers and visible thumb
41 days	Development of the palate
42 days	Differentiation of fingers of the hand and of the spinal column, although it is cartilaginous
43 days	Formation of the tongue and dental lamina
44 days	The eyelids begin to be formed
45 days	The tip of the nose is individualized and takes shape
46 days	Beginning of bone formation, the nipples are visible, loss of part of the villi, smooth chorion in the placenta
47 days	Beginning of formation of the genitals
48 days	The trunk lengthens and straightens out. The liver produces most of the red blood cells
49 days	The formation of the stomach is visible. The intestine is still herniated
50 days	The arms are bent at the elbows, and fingers are separated
51 days	Perforation of the anal membrane
52 days	The face takes shape
53 days	The hands and feet move towards the median line
54 days	Separation of the toes
55 days	All of the internal and external structures exist in rough form - end of organogenesis
56 days	The head takes human form, some ossification points are clearly visible

57 days	Definite ossification points at the vertebral level
58 days	Development of the intestines within the umbilical cord
59 days	Primary, secondary and tertiary bronchi
60 days	The heart, with its four cavities, is completed
61 days	The lower maxillary takes shape
62 days	Gradual muscle development and local muscular contractions
63 days	Eyes closed or gradually closing
64 days	The liver continues to produce red blood cells
65 days	Head more rounded and chin more prominent
66 days	The face looks human
67 days	The neck begins to grow longer
68 days	The genitals are differentiated
69 days	Rotation of the primitive gut
70 days	Dental buds (temporary and permanent teeth)
71 days	Development of the cartilage of the bronchial tissue
72 days	The arms are proportioned to the body
73 days	The legs are still short
74 days	The ribs are visible
75 days	The kidneys begin to filter the blood and to produce urine, which is evacuated in the amniotic fluid
76 days	The gut returns to the abdominal cavity
77 days	The fingernails begin to develop
78 days	Nerve cell migration is completed, neuronal interconnections are intensified
79 days	The ossification process is intensified
80 days	All of the basic structures of the brain are well established. Since the brain will be in command throughout the individual's life, this major point, the 80th day, is viewed as the end of embryonic life
81 days	Definite movement, but not yet perceived by the mother
82 days	The epidermis now has three distinct layers
83 days	Beginning of bile secretion. The intestine has returned to the abdomen
84 days	The spleen «takes on» the function of producing red blood cells. Thyroid activity specific to the foetus is detected. The primary ossification points of bones are formed

21

91 days	The neck is evident, separating the head from the trunk. The bladder is visible
98 days	The head is erect and well structured, the ears begin to stand out from the head. The labial depression appears
105 days	Hands and feet are well developed and mobile, so that the foetus may move (it kicks, turns over, opens and closes its hands)
112 days	Development of down on the body. The uterine cavity is pronounced. The uterus fills the mother's womb and begins to swell towards the abdomen. The layers of the skin are still transparent.
119 days	The spinal column is well structured, the diaphragm is visible. The vocal cords and the vocal apparatus are clearly differentiated, although the foetus is unable to utter a sound since it is immersed in a liquid environment
126 days	The vernix caseosa begins to be deposited on the skin of the foetus (this is an oily secretion that protects the skin from the drying effect of the increasingly salty liquid in which it bathes). The superficial blood vessels may be seen under the skin
133 days	First respiratory movements, mobilizing the liquid in the lungs. The toe-nails begin to develop
140 days	The placenta is ripe, the face and body are covered with down. Enamel and dentine begin to be secreted. The sleep/wake cycles begin
147 days	Development of lumina in the airways
154 days	The skin is wrinkled and red. Muscles are increasingly developed and active
161 days	Gradual calcification of the skullbones. Facial expressions are seen
168 days	Fingernails are practically complete. The entire body is covered with a fine coating of vernix
175 days	First folds in the brain cortex. Temperature and breathing are controlled
180 days	End of the early foetal phase
182 days	Eyes partially open and eyelashes present. Beginning of production of pulmonary surfactant (lamellar inclusions), required for respiratory adjustment at birth
189 days	The pulmonary alveoli begin to develop
196 days	The eyes are open, the retina is receptive to light. The skin is less wrinkled, as subcutaneous fat is gradually deposited

22

203 days	The peculiar structure of the spleen is present, the bone marrow takes on the role of blood production, once and for all
210 days	The toe-nails are almost complete. Pupillary reflex in the presence of light
217 days	The testicles descend into the scrotum. The soles are well formed, but the skin is still smooth, with no creases
224 days	The face is no longer covered with down
231 days	The skin is pink and smooth. The fingernails reach the fingertips
238 days	The areolae and nipples begin to be seen, along with wrinkles and creases on the front part of the soles
245 days	The foetus clenches its fists
252 days	The foetus begins to flesh out, its skin is pink and some blood vessels are visible. The toe-nails continue to grow
259 days	The flexion of the limbs increases, as does the pressure exerted
266 days	The down is now confined to the back, the testicles are in the scrotum or the inguinal canal, the chest is prominent, the breasts jut out, there are creases all over the soles of the feet
273 - 280 days	Normal, full-term delivery, triggered by the secretion of oxytocin and the lowered progesterone level.

THE PLACENTA

The placenta is the organ in which mother and child come together, and each of the two contribute to building it. It weighs about 500 g, is 3 cm thick, has a diameter of 20 cm and an absorption surface of 10 m^2, which may be extended to 90 m^2 through maturation of the villi, and may therefore be viewed as the most voluminous foetal organ. The blood/blood barrier is separated by the same distance that will be found later in the lungs, between the air and the alveolar wall capillaries. The placenta acts as both lung, liver, kidney, intestine and endocrine gland.

Breathing	Exchanges of oxygen and carbon dioxide take place in the placenta.
Nutrition	The placenta enables the uptake of water, minerals, proteins (amino acids), carbohydrates (sugars and glucose), lipids (fatty acids and cholesterol) - necessary for the foetal elaboration of steroid hormones - and of vitamins B, C, E and (synthetic) K1.
Storage	The placenta stores glycogen, calcium, iron and proteins.
Production	The placenta produces glycogen, enzymes and hormones (chorionic gonadotrophin, progesterone, oestrogens and placental lactogenic hormone).

Protection and filtration

The placenta affords protection against germs and parasites, most of which are stopped by it ; it allows IgG antibodies and medication to cross over.

The placenta eliminates carbon dioxide (CO_2), urea and uric acid.

THE AMNIOTIC FLUID

Origin

It is of foetal origin : it is produced by the skin until 20 weeks, but from 30 days on the umbilical cord also plays a role (through dialysis). Bronchopulmonary secretion plays a role after the 20th week, and the amniotic fluid is filtered by the kidney, and comes out in the urine at 10 weeks.

A maternal source, involving transsudation, is mentioned. Still, exsudation is perhaps the main source of the amniotic fluid.

Reabsorption

Reabsorption occurs through the skin of the foetus, as well as through the umbilical cord, by swallowing and intestinal uptake.

Functions

The amniotic fluid affords protection against pressure and blows, it maintains a constant temperature and allows the foetus to move around without too great an effort (floating in water is good for neuromuscular development). It helps to distribute pressure evenly over the entire uterus, prevents the creation of adhesions - that is, while the embryo is still gelatinous and does not yet have a well-developed skin, the amnios does not adhere to it - and is conducive to the symmetrical, regular development of both embryo and foetus. The amniotic fluid receives the substances excreted by the foetus, and its mineral concentration increases gradually. During delivery, it protects the baby's head and helps to dilate the cervix. Another important point is its antibacterial function, through which the environment is kept sterile throughout gestation.

INTRAUTERINE STIMULATION

The foetus growing in the uterus is not a passive creature but rather, an individual capable of reacting to stimulations of all sorts, of relating to its surroundings and of developing intensely during the gestation period. Not only is the foetus able to respond to stimulation through its senses, which are already developed, but it also expresses its psychological potential, even before birth. A number of methods of pre- and post-natal stimulation are used to optimize the infant's development, so as to achieve the best possible expression of both psychological and intellectual potential.

During the prenatal period, the objectives of intrauterine stimulation are twofold :

- to reinforce the emotional bonds between the unborn child and the mother and/or the group in which she is living (parents, grandparents, etc) ; this is conducive to the development of the child-to-be in a climate of affection, communication, security and harmony, and to its future education in the best possible social, psychological and emotional conditions. This attitude is helpful in preventing some reactions such as emotional deprivation and child abuse, which may considerably hinder children's normal development ;

- to have early action on brain maturation, through sensory stimulation appropriate to the prenatal period (vision, hearing, touch, taste and equilibrium).

It is up to parents to put this programme into practice, since they are in the best position to do so, and the most competent to constitute this emotional bonding, from the outset. Stimulation, as defined here, does not require any sophisticated system, technology or special resources. It takes a little time, during which the mother may relax, as well : once this space for communication between the mother and her child is set up, at the very beginning of gestation, it should be maintained throughout the child's life.

Auditory stimulation

Auditory stimulation includes those stimuli that are permanently experienced throughout gestation, such as the beating of the mother's heart and arteries, rumbling of the bowels, sounds coming from the surroundings, the father's and mother's voices. It is advisable to speak to the foetus in a louder than usual voice, toward the lower uterine segment, where sound conduction is best. The use of a tube or paper cone improves transmission of the sounds. This is the time to convey love, to say enriching, positive things. Music, preferably classical or soft music, may be played : it will help the mother to relax, as well. More aggressive music such as rock music or variety is not recommended. The mother may also begin to sing songs, nursery rhymes and lullabies to her baby. Stimulation and exchanges of this type may last from 15 to 30 minutes, depending on the mother's possibilities.

Vestibular stimulation

Vestibular stimulation is caused by permanent stimuli such as the movements produced by the mother's breathing, exchanges within the amniotic fluid (its absorption and production) and the mother's movements as she goes about various activities.

Tactile stimulation

Tactile stimulation is permanent, through the baby's contact with the walls of the uterus. There is also the movement of the amniotic fluid and foetal self-stimulation, as when it sucks its thumb, starting from the gestational age of 11 weeks. The mother may provide additional stimulation by gently caressing her belly, or by placing her hands on the place where the baby is kicking, to offer resistance.

Visual stimulation

The foetus perceives light by the 21st week of gestation. Stimulation occurs when the mother goes from a well-lit place to darkness, or when she is in sunlight. It is not a good idea to stimulate the child by directing natural or artificial light to the mother's belly.

Stimulating taste and smell

Stimulation of taste occurs throughout pregnancy, when the foetus swallows the amniotic fluid. Olfactory stimulation, or smell, can only be artificial, using substances that enable the

child to recognize its parent' odour. For this reason, skin contact should be encouraged from birth on.

ATTITUDES TOWARDS MEDICATION AND DRUGS

Although it is generally agreed that pregnancy should be a period of relative abstinence from the consumption of medication, the fact is that pregnant women often consume a great variety of pharmaceuticals, and in large amounts, be they vitamins, iron, antacids, antibiotics or diuretic agents. Sometimes these therapeuticals are prescribed rightly, for a serious illness, but often they are the product of self-medication or of prescriptions delivered at the patient's request.

Alcoholic beverages are not recommended during pregnancy. Through the blood stream and the placenta, the alcohol absorbed by the mother is passed on to the foetus, with generally much greater effects than on the mother, since the effect of a substance or medication is proportionate to the weight of the person who takes it. The foetal alcohol syndrome is a well-known pathology in children born to women who are heavy drinkers.

Many studies have shown that smoking is correlated with an increased incidence of miscarriage, intrauterine growth retardation, perinatal mortality, placenta praevia and early descent of a normally inserted placenta ; this is due to impairments in the placental function, since nicotine causes vasoconstriction. This temporary hypoxia has repercussions on the foetus, in the form of a quickening heartbeat and a reduction of active movements.

The risks described above are multiplied by ten when the mother is a drug-user, since the biological risks are compounded by psychological risks and others connected with the parents' sociocultural environment.

THE PREGNANT WOMAN'S DIET

During gestation, the child's growth is influenced by the mother's diet. A poorly balanced or insufficient diet may affect the child's growth and the development of bones and teeth.

An inadequate nutritional status in the mother, and above all a low weight for height, is one of the main causes of intrauterine growth retardation, low birth weight and post-natal malnutrition in both the child and the mother. This situation may well affect the child's future development and expose it to greater risks of disease or death. Overweight and obesity also entail exposure to risks (hypertension during pregnancy, gestational diabetes and difficult delivery, and consequences for both mother and child following childbirth).

The best way to prevent these circulatory and nutrition-related disorders during pregnancy, and to arrive at the birthing and lactation period in a satisfactory state is to eat properly.

It is important to have a regular mealtime schedule, whenever feasible, with four meals a day, for it should be remembered that the baby is growing gradually, all the time, and therefore must be given the elements needed for development every day. Imbalances such as heavy meals followed by fasting should be avoided, then, since some substances such as vitamins are not stored in the body and must be absorbed regularly. The gestation period is not the right time to start a weight-loss diet, then, no more than it is a time to eat for two : the quality of the food eaten is more important than the quantity.

Table 1

Daily dietary requirements of a moderately active adult woman weighing about 55 kg (1)

Energy and immediate principles	Not pregnant	Pregnant (beymond 4 months)
Energy	2,200 Kcal	2,550 Kcal
Proteins	30-40 g	40-55 g
Calcium	400-500 mg	1,000-1,200 mg
Iron	15-30 mg	60-240 mg
Vitamin A	750 µg	750 µg
Vitamin B1	0.9 mg	1.1 mg
Vitamin B2	1.3 mg	1.5 mg
Niacin	14.5 mg	16.8 mg
Vitamin C	30 mg	50 mg
Folic acid	200 µg	400 µg

(1) Provide iron and calcium complements.

SURVEILLANCE OF PREGNANCY

SURVEILLANCE PROGRAMME

The surveillance described here is taken from the CLAP (Latin American centre for perinatology and human development) programme.

Throughout pregnancy, systolic blood pressure should be somewhere between 95 and 135 mm Hg and diastolic pressure between 55 and 90 mm Hg in a seated woman.

Between the 30th and the 40th week, the mother perceives an average of ten foetal movements over a 2-hour period (four 30-minute periods in the course of a single day).

Uterine height should be monitored regularly during antenatal visits (see figure 2).

TOOLS FOR SURVEILLANCE

Charts

First, three pieces of information are collected : gestational age and mother's weight and height. The percentage of the reference weight/height (W/H) is then calculated, using the nomogramme (figure 3). To do so, a straight line is drawn, using the figures for weight and height, to meet the W/H indicator line. This locates the mother with respect to the reference W/H ratio at the beginning (or in the course) of pregnancy. For example, a woman measuring 162 cm and weighing 63 kg has a ratio of 110 %. The woman returns at 28 weeks of pregnancy and weighs 66 kg. On the weight gain chart (figure 4), we look at the weight curve corresponding to 110 % at 10 weeks of gestation. At 28 weeks, the mother should be at 117 %, and is in fact at 115 %. Her weight gain is therefore satisfactory.

Figure 4 illustrates charting of nutritional status. Area A corresponds to low weight for height, area B represents what is considered a «normal» nutritional status, area C contains the overweight and D the obese. These areas may be coloured, to make them easier to read : red for area A, green for B, yellow for C and orange for D.

Desirable late pregnacy weight

The nomogramme is also useful for calculating the desirable late pregnancy weight. This is especially valuable for women with a low initial weight ; mothers located in area B should gain about 12 kg, those in areas C and D a minimum of 7.5 kg. It is important to determine the desirable weight for a mother whose weight is initially low, so as to provide dietary guidance. To do so, a line is drawn between the mother's height and a W/H of «120 %» ; the weight line that crosses this imaginary line is the desirable weight at the end of pregnancy. The mother's present weight is subtracted from this figure to obtain the number of kilos the mother should gain in the course of her pregnancy. For example, a low-weight mother measuring 1 m 54, for whom a 120 % weight/height ratio is recommended should weigh 64 kg at the end of her pregnancy. If she only weighs 50 kg at 12 weeks, she should take on 14 kg.

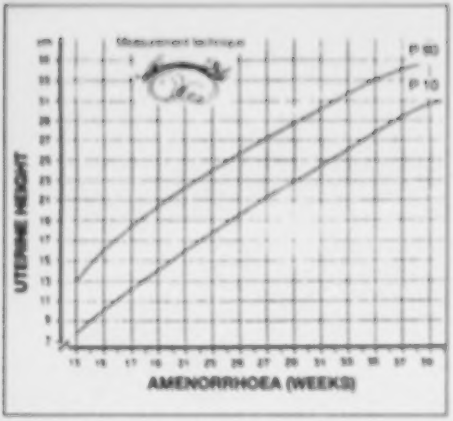


Figure 2 : Monitoring of uterine height.

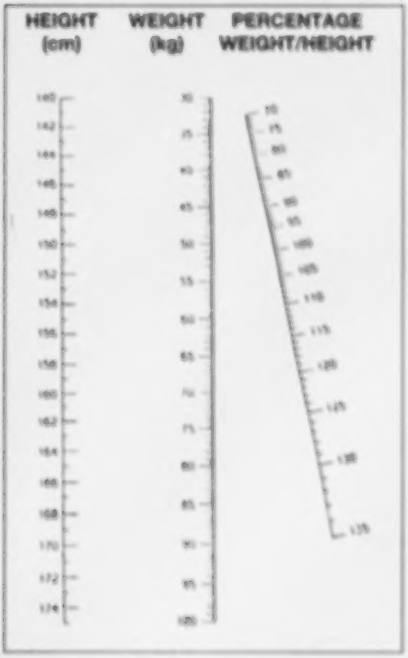


Figure 3 : Nomogramme for calculating the mother's weight for height ratio as a percentage of the reference figure.
Source : P. Rosso, Am. J. Clin Nutr. 41 : 644-652, 1985.

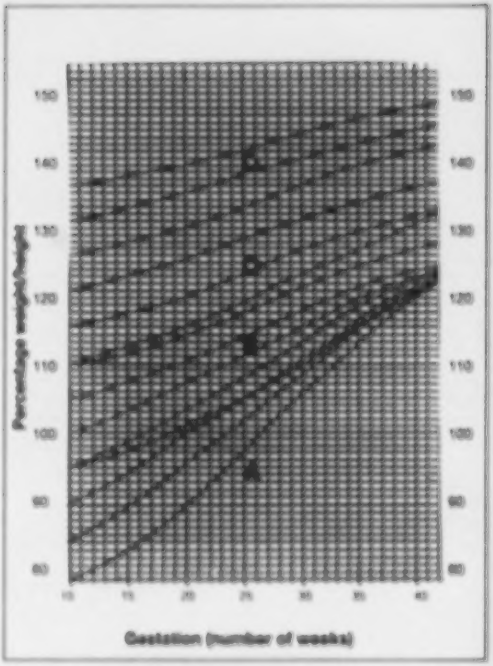


Figure 4 : Chart for monitoring weight gain during pregnancy with reference to the woman's height and weight at the beginning of pregnancy.
Source : P. Rosso, F. Mardones S. and collaborators. Health Ministry of Chili, 1984.

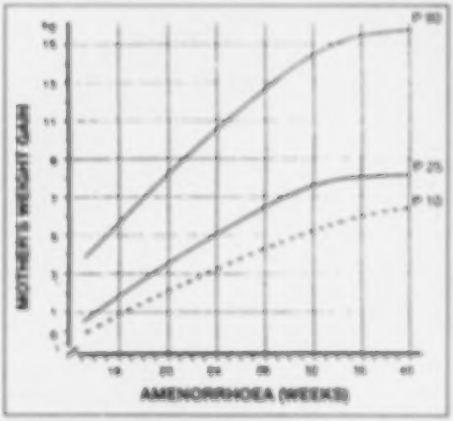


Figure 5 : Weight gain chart.

Weight gain

Gaining weight during pregnancy is not a uniform process (see figure 5). Every normal woman has periods when her weight gain deviates from the average figure. The curve is useful in charting these fluctuations and identifying those deviations which, if serious, may require the attention of health workers. This means that the small area defined by the increment lines located immediately above and below the point on which the particular mother's initial weight/height ratio is found should be used as a weight gain pathway. If the mother's weight gain leaves that pathway at the various monitoring sessions, and is either excessive or deficient, careful evaluation of the situation is recommended, except if the mother's weight is located on one of the lines or very near one. If this is the case, the evolution until the next antenatal monitoring session should be observed. When insufficient weight gain, as defined by this method, is found, the expression used is «low increase».

Exceptions

Adolescents

The chart may underestimate weight gain in girls who conceived within four years of their first menstruation period. These young mothers should take on one kg more than is indicated on the chart.

Tall women

The chart does not indicate any figures for mothers measuring over 1 m 74. A weight gain of 7.5 to 10.5 kg is suggested in this case if the mother is obese, a 10.5 to 13.5 kg gain if she seems normal, and over 13.5 kg if she is wasted.

Extreme weights

If the mother is very markedly obese (initial weight over 135 % of the reference figure), a weight gain of 7.5 to 10.5 kg is recommended. If she is very thin at the beginning of pregnancy (weight below 80 % of the reference figure at 10-12 weeks of gestation), a minimum weight gain of 15 to 17 kg is recommended. Once her weight has improved somewhat, the reference curve may again be used.

ADVICE FOR PREGNANT WOMEN (1)

First three months of pregnancy

Avoid any medication that is not indispensable
Tell your doctor that you think you are pregnant, to avoid potentially harmful prescriptions
Avoid abortive herb teas and other attempts at abortion
Attend antenatal consultations and have your teeth checked by a dentist
Avoid unnecessary efforts and long trips
Do not smoke, drink alcoholic beverages, take stimulants
Avoid situations eliciting annoyance, anger, fear, strong emotions

Second three months of pregnancy

Take walks every day (1/2 hour morning and afternoon)
Prepare your breasts and nipples, wear a brassiere
Massage the skin of your belly, using a cream
Eat fruit and vegetables, avoid excess starches, fats and pastry

(1) This advice was formulated following a survey of men and women in Cali (Colombia) neighbourhoods between 1988 and 1989, to determine popular knowledge about gestation.

Eat proteins (meat, fish, grains, dairy products)
Do not double your food ration (do not overeat)
Prepare for childbirth

Last three months of pregnancy

Avoid constipation (by eating properly and exercising)
Do not overtire, avoid vexations and stress
Be careful when sitting down, bending over or crouching
Avoid spices, sparkling drinks and overly heavy meals
Use salt sparingly (eat normally)
Wear loose garments and practical, low-heeled shoes
Avoid excessive roughness in sexual intercourse

THE EXPECTANT MOTHER, HER FAMILY AND SOCIAL ENVIRONMENT

For a better understanding of the mother-child dyad during gestation, an analysis of how the mother experiences her pregnancy, emotionally and in daily life, as well as of the reactions of the father, the close family and the health personnel is presented below (see figures 6, 7 and 8).

Pregnancy is an event rich in profound values for the people involved : for the mother, first of all, since she is the source of life and protagonist in gestation, but also for the father, the family, the health personnel and more generally everyone who lives with the mother or contributes in one way or another to the act of giving life to and building a child.

The bonds the expectant mother develops with her baby depend on the quality of her relations with those around her, as well as on how she relates to herself. For instance, the fact of having had a good emotional relationship with her own mother, when she was a child, will be most important in enabling her to go through her own pregnancy and to establish an intimate bond with her child during gestation. The mother's relations with those around her are also influential during this period. Her relationship with her spouse is very important. The baby must be the child of both father and mother, of the couple. The father's commitment, help and support are essential for the mother. The father's experience also counts, since pregnancy is a constitutive experience for the couple. Although the father is not physically involved in gestation, he too experiences a period of expectancy.

The family and health personnel play a role as well, since they are an integral part of the psychological environment of the mother, father and child.

Role of the family

The home, and more broadly speaking, the health group, may become a «womb» for the mother, in which her emotional as well as biological needs may be met, and in which she feels protected, welcome, understood and loved. This atmosphere, along with her own psychological history, will be conducive to the expression of her maternal function, with the development of her child within her body, and also in her mind. If the relations established by the health personnel with the mother

are pervaded with a warm, receptive, comprehensive attitude, then the health centre will provide the support required for developing an intimate relationship with her baby.

The mother-child dyad is established gradually, qualitatively, based on the child's emotional development : the child's future relations with others and with the outside world will be patterned on this early experience. It is therefore extremely important that the mother receive support during her pregnancy, so that this process will go well.

Preparation for motherhood begins in early childhood

Experimenting with motherhood begins in infancy, with the little girl's trustful, intimate relationship with her mother, which is essential in preparing her, in turn, to be a mother. When little girls play with their dolls, or take care of other children, they are learning their future role as mother. During this play, the girl tries to imitate her mother in caring for a baby, or awaiting a baby. In doing so, she hopes to receive the same advantages as her mother, such as her father's love, or a baby of her own. Since her dreams cannot yet come true at that age, she is sometimes angry or infuriated with her mother, but at the same time, she wants to resemble her. This contradiction is frightening, and helps her to project the desire to be like her mother into the future. She will «be a better mother» then. All of these experiences with her mother will shape the way in which she accepts or rejects motherhood. Once she is pregnant, the woman will really relive some of her memories, and the reminiscences of her own mother's competency as a mother will definitely play a role. Each woman experiences her motherhood in her own, specific way, on the basis of her own emotional and psychological history. Each woman imagines how she would like her child to be. As soon as the child is conceived, the mother begins to bring it to life within her womb. Gradually, the ideal portrait is modified through contact with reality.

The mother's private world, grounded in her early childhood and her past relationships, but also in her present-day personal and interpersonal ties, prepares her for motherhood and determines the quality of the bond she is beginning to establish with her child. The social and family environment in which she lives will play a decisive role here.

She may reproduce her childhood experiences, but this partly depends on the attitude of those around her, when faced with this pregnancy.

Father and mother : a twosome

The role of the «father-mother» twosome is essential in establishing an adequate relationship between the mother and her child. If the latter is truly conceived by the couple - that is, if both father and mother, together, decided to have a baby, they will give this emotional meaning to the act. When intercourse,

the act of conceiving, is experienced in this way, the mother receives support, presence and attention from the father from the outset, and this helps to develop her own competency as a mother.

Fatherhood

But what does the father experience during the pregnancy period ? He too relives situations from his childhood, his relations with his mother, father, brothers and sisters. His attitude towards his wife is linked to his childhood experiences. He may feel jealous because his wife is pregnant, he may resent the intruder, who threatens to take his place. The father's attitude towards motherhood is affected by his early relations with his own mother. The pattern of his childhood relations with his father and mother returns again, at adulthood, when he is faced with his wife's pregnancy. In many cases, the man's distant, scornful attitude towards his pregnant wife is the result of his experience with his mother. Sometimes the man turns to other women when his wife is pregnant or nursing : this is because he is jealous of the unborn baby, and angry at it.The father plays an important role, since he may extend emotional support for the mother, and help her to maintain a state of mind conducive to keeping pregnancy, and later breast-feeding, on a satisfactory course, provided he is able to feel close to his wife and future child. The mother will then feel loved and understood, and may in turn love her child and intuitively understand its physical and emotional needs. It is essential, then, to take good care of the expectant mother, since what is at stake is the quality of the life of a person who will later make a contribution to the community. In short, we may say that the people in contact with the mother, including the health personnel, should form a part of the experience of pregnancy, through the support they provide. The mother may then give her child a better reception, and care for it emotionally as well as biologically, thus creating bonds of love and exchanges.

Comments

There is no doubt that pregnancy is a natural event, and woman's privilege. It matures her, physiologically, and yields some advantages, but it is also accompanied by some complications and problems, and transforms her existence considerably. Irrespective of the way in which the father participates in the process, and despite the fact that he is not the biological carrier of the child, his close ties and collaboration throughout this process are essential. Both parents must establish a relationship with the child before it is born, both should participate in intrauterine sensory stimulation and in making sure that their child's social and familial environment will be as warm and receptive as possible.

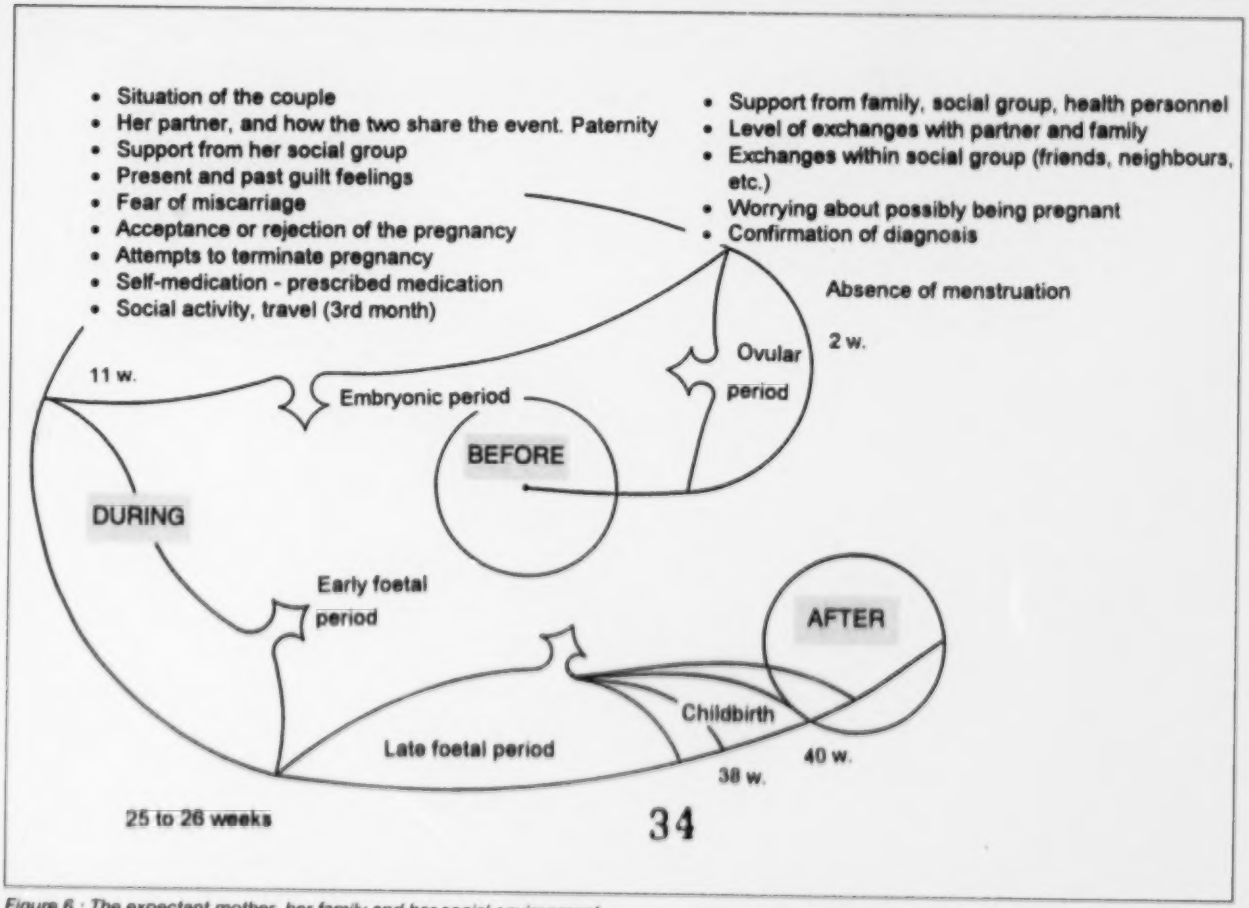
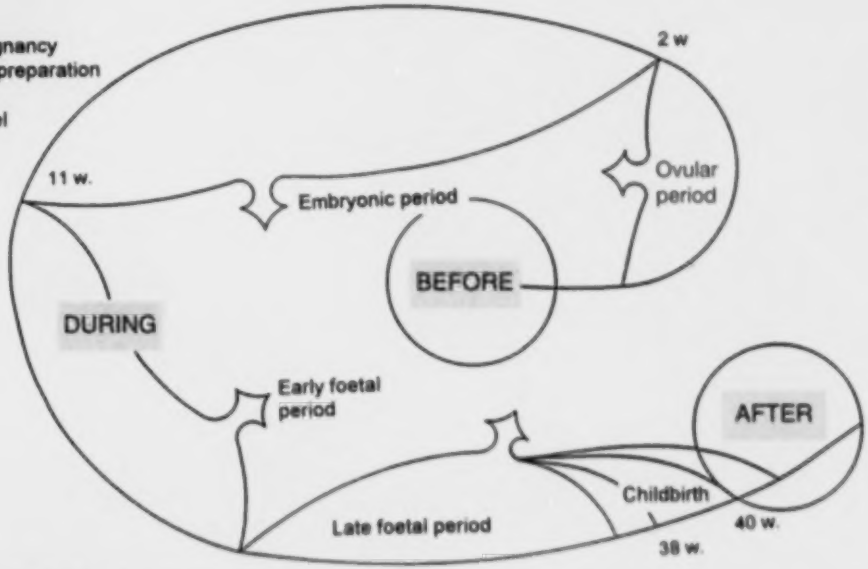

• Situation of the couple
• Her partner, and how the two share the event. Paternity
• Support from her social group
• Present and past guilt feelings
• Fear of miscarriage
• Acceptance or rejection of the pregnancy
• Attempts to terminate pregnancy
• Self-medication - prescribed medication
• Social activity, travel (3rd month)
• Support from family, social group, health personnel
• Level of exchanges with partner and family
• Exchanges within social group (friends, neighbours, etc.)
• Worrying about possibly being pregnant
• Confirmation of diagnosis
Absence of menstruation
2 w.
Ovular period
11 w.
Embryonic period
BEFORE
DURING
Early foetal period
AFTER
Childbirth
Late foetal period
40 w.
38 w.
25 to 26 weeks
34

Figure 6 : The expectant mother, her family and her social environment.

- Sex (boy or girl) - twins ?
- Fear of malformations
- Immunization of the mother
- Diet and weight
- Dental check-up
- Surveillance of pregnancy
- Physical exercise : preparation
- Work for livelihood
- Social activity, travel



- Confirmation by ultrasound testing
- Uterine puncture for diagnosis of malformations
- Acceptance or rejection of boy or girl
- Preparation for birthing
- Sexual intercourse
- Sleeping in a position that does not press down on the baby
- Physical conditions after delivery - prevention of stretch marks

35

Figure 7 : The expectant mother and her health, family and social environment.

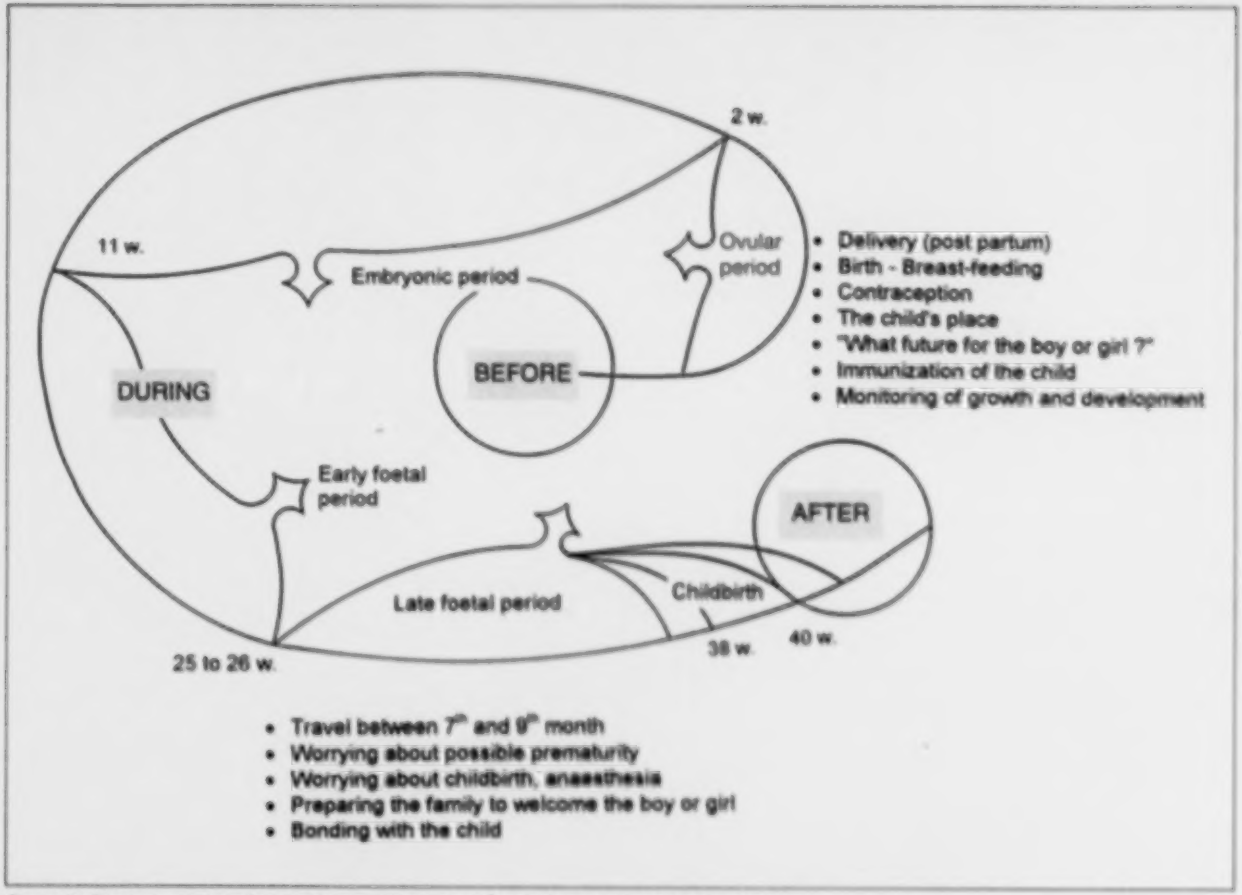


Figure 8 : The expectant mother and her health, family and social environment (continued).

PREGNANCY AND CHILDBIRTH : A PSYCHOLOGICAL AND PHYSIOLOGICAL EXPERIENCE

Pregnancy is a normal biological process that influences the psychological maturation and social behaviour of both parents. As a rule, it is experienced as a new, beneficial experience, and therefore as something positive. But the process lasts nine months, during which there is much time for anxiety, doubts and questioning.

PREGNANCY

Like puberty and menopause, pregnancy is a critical period in the life of a woman : one in which major physiological, mental and social changes occur. Both men and women have conscious or unconscious phantasies about conception, gestation and birth. Pregnancy not only transforms the woman's body, but it also generates expectations for herself, her baby, her relations with others, her personal feelings about her own childhood and her relations with her mother. Men experience a similar psychological process.

The desire to have a baby

The child exists before it is born : it exists in the expectations of its parents and their social group, and it also exists in the parents' phantasies. At birth, the child is practically defenceless, and subsists thanks to its mother's desire, which goes far back in time, long before the baby was conceived.

Each pregnancy has its own history, and so it is unique and specific, even for a same woman.

The desire to have a child includes the desire to discover resemblances in it, reflecting the specific creative element in each parent.

Father's support

Pregnancy and early bonds with the baby, as well as childbirth, are strongly influenced by the father's attitude. Her husband's emotional support during pregnancy helps the woman to adjust to this new situation, with its fears, bodily changes and moods. As a rule, the expectant mother feels lonely and unique, she needs to lean more on someone, and wants to be protected. The changes in her appearance disturb her, and she worries that her husband may no longer love or desire her. Ideally, a pregnancy should be desired. It may not have been planned, but as soon as it becomes evident, it should be desired and accepted, not only by the mother but by the father as well, by the couple. These nine months give both parents the time needed to accustom themselves, psychologically and physically, to gestation and to ready themselves to raise the child.

During pregnancy, some signs of psychological confusion mixed with anxiety may be seen. The elation experienced during the first days or weeks following diagnosis of the pregnancy may veer to fear of what is involved in this new responsibility. Both parents

encounter periods of rejection and acceptance that surprise them. These feelings may elicit some guilt feelings in one or the other, often hidden. Pregnancy is a period of trial and anticipation, during which ties are slowly but surely established with what is an imaginary child at first, later on a felt one, and at last one that is seen, heard and touched. The quality of the relationship within the couple, and the gradual changeover from a two-person relationship to a triangle including the child, the nature of the sensory and emotional stimuli, along with the attitude of those around them are all important in ensuring the future. It is up to the mother to facilitate and encourage the father's contact with the baby in her womb, so that this «first stranger» may gradually cease to be a stranger, since the fatherly function is fundamental to the child's psychological structure.

The parturating woman's demand for analgesics tends to decline and her experience of childbirth is more positive when her spouse is present during delivery. The father also derives satisfactions from this participation, since it reinforces his relationship with his wife and introduces him to the joys of fatherhood. From the instant of birth, the child transforms both parents. They had an image of a baby, and now they are faced with an actual human being, a little boy or a little girl, who grows and develops, and opens new horizons for them, since a child is a constant source of questioning.

The first three months

During the first three months of pregnancy, the main problem for both the man and the woman is the discovery and acceptance of the fact. The father should continue to be the woman's partner, and pregnancy yields an opportunity to reassert and reinforce the couple's ties. Their attitude during the first years of the child's life is greatly influenced by the way this period is experienced and by the quality of the relations and of the commitment of each of the two partners. The first three months is a transitional period during which nidation takes place : that is, the reception of the fertilized ovum in the mother's womb, its development into an embryo and then its transformation into a foetus.

The presence of the embryo is revealed by the absence of a menstrual period and in some women by the development of symptoms caused by hormonal changes (by the presence in the blood of gonadotrophins, which are hormones produced by the cell layer that surrounds the fertilized ovum, part of which will later become the placenta). There may be more subtle modifications such as changes in the colour and sensitivity of the nipples, fullness of the breasts, drowsiness, etc.

Role of the health team

At this point, the future parents readily accept help from a doctor, a midwife or a member of the health team, or even of an experienced mother, especially if this is their first child, since they are in search of a person who will listen to them and answer their questions. The woman generally reacts confusedly to the early physiological changes : she encounters sensations and feelings that she is capable neither of locating nor of analysing properly.

She is anxious to understand her intense emotions, and to receive appropriate surveillance while she readies herself for motherhood.

The mother's identity

The first three months is the most interiorized period of pregnancy, one that raises the problem of shaping the woman's unique, personal identity as a mother, independent of and different from that of her own mother. The experience of pregnancy brings out some conflicts dating back to childhood, and especially those involving her two parents. It is a period of dreaming and turning inward, when the expectant mother relives her own childhood. Feelings of love and hate, frustration and satisfaction, dependency and rebellion, all a part of the mother/daughter relationship, surface again, stronger than ever. She then becomes concerned about what her relations with her own children will be like, and what kind of mother she will be. She hopes she will do better than her own mother, but continues to identify with her. Pregnancy is a difficult challenge for the couple, especially if both parents are young and in this position for the first time : it involves becoming parents while remaining children themselves.

The second three months

The most important experience in this period is feeling the child's first movements. These sensations prove that the pregnancy truly exists, and thus justifies the changes in the woman's body. It is also proof that the child is alive. The first movements are a major event : the news is shared by the parents, the family and friends.

First foetal movements

Once these movements are perceived, it often becomes easier to establish a relationship between the mother, the father and the foetus, since the latter is capable of feeling and making itself felt, even if it is not ready to be born. By acknowledging his role as father, the husband procures a degree of relief for his wife : she is not alone in her responsibility towards the child. The father's participation is most important : she feels that the baby in her womb is not hers only, but her husband's as well.

Last three months

During this last phase, the mother does much thinking about how delivery will transpire, when, how and under what conditions, what will the child look like, will it be a boy or a girl, how will it grow ? Sometimes the fear of dying during birthing takes on major proportions, even if unconsciously so. The husband too may feel anguish, with a sense of responsibility but also of fear.

The woman needs to receive attention from those around her, and especially from her family. The presence of her mother and her husband is particularly precious. During this period, foetal movements are more frequent, full and intense, and most mothers are able to recognize and describe them in detail. They are also able to detect what their baby is doing at different times of day (moving around, resting, awake, sleeping).

There is no doubt that the experience is very different depending on whether the pregnancy was greatly desired or was undesired, and modifies the couple's plans.

The sociocultural and economic situation within which each pregnancy and each birth take place vary from one country to another, and from one human community to another. Pregnancy and childbirth are socially significant, and there may be numerous demands coming from the family group, and which affect the future parents. Social pressure is a combination of beliefs, myths, taboos and popular practices, which play a major role in people's psychological experience. The health personnel must be familiar with these, understand them, see them as meaningful and take them into consideration in the educational process.

Important psychological aspects

In short, a number of psychological aspects must be taken into consideration during gestation : first, there is the desire (each parent's desire to have a son or a daughter), then the actual emotional ties (the parents' ability to develop emotional bonds with the unborn baby). There are also the relations between individuals (interdependency, dependency and independence). Self-esteem, fear, phantasies and jealousy are all elements that condition each person's equilibrium. Last, it is important, in preparing for this new stage of life, to analyse the person's state of mind (excitement, elation, sadness, depression, acceptance or rejection of the pregnancy).

Pregnancy and sexuality

The quality of the relations (including the sexual relations) that the pregnant woman establishes with her partner affects the relationship she develops with her baby and the way in which she learns to be a mother, but it also affects her relations with her partner as father. Successful, harmonious life together, in an atmosphere of mutual understanding, is balanced on a subtle equilibrium between autonomy and intimate communication. In the couple's relationship, sexual intercourse releases tensions, procures the pleasure of contact and intimacy, and is conducive to the expression of mutual love and satisfaction. Sexual satisfaction should be experienced as a manifestation of tenderness, affection and pleasure, which is to say, much more that a strictly physical relationship. It gives greater self-assurance to the mother, makes her less anxious and calms the baby.

Infections and pregnancy

Severe infectious diseases in a pregnant woman may induce miscarriage, foetal death or premature delivery. Furthermore, when the infectious agents succeed in entering and circulating in the mother's bloodstream they may affect the embryo and foetus in various ways, depending on the point of gestation. Viruses, as opposed to bacteria, cross the placental barrier relatively easily. Syphilis and protozoans are only able to cross the barrier after 4 months of gestation, when the placenta has matured.

Vaccinations and pregnancy

This explains why some infections, such as those comprising the TORCH syndrome (Toxoplasmosis - Rubella - Cytomegalovirus - Herpes) may cause embryopathy while others will only induce foetopathy or will infect the baby at the end of pregnancy or during childbirth.

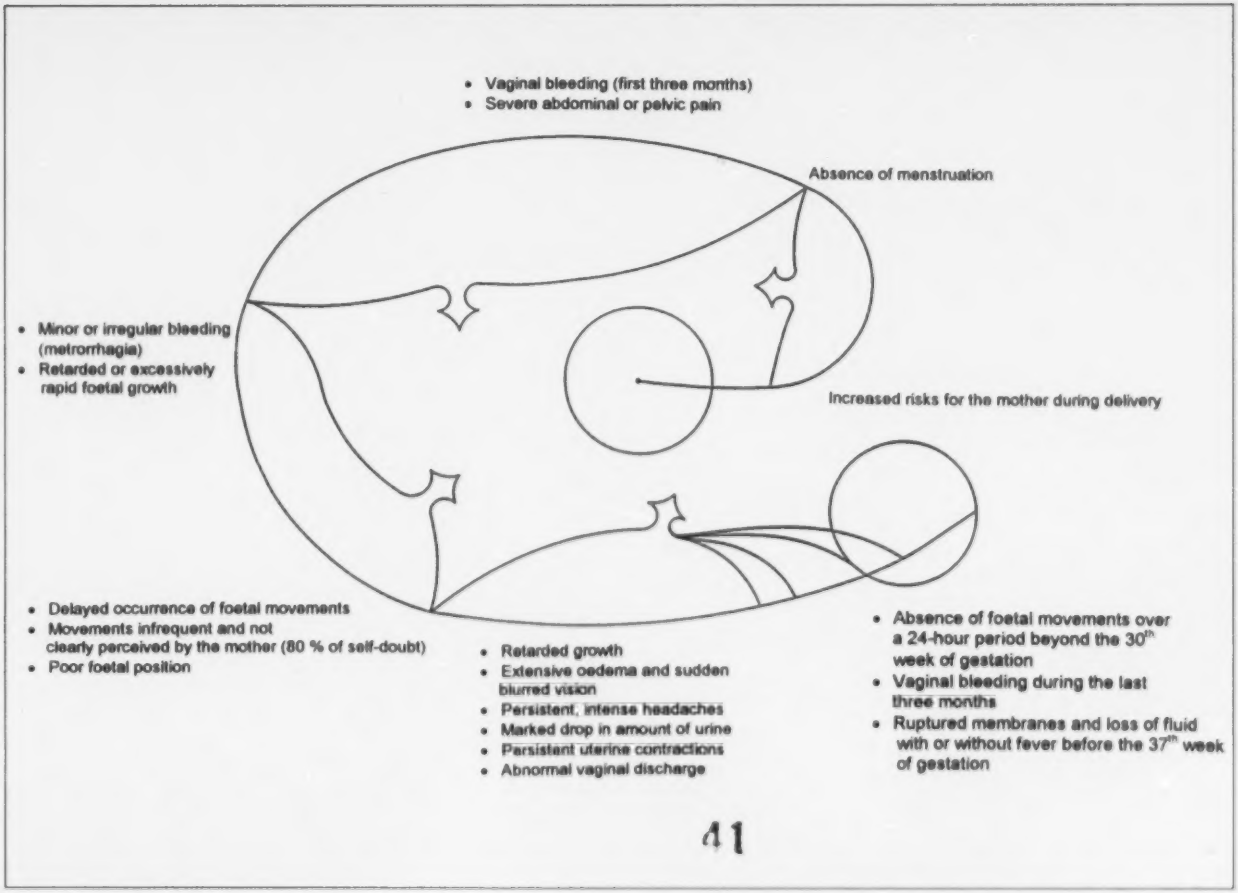

• Vaginal bleeding (first three months)
• Severe abdominal or pelvic pain
Absence of menstruation
• Minor or irregular bleeding (metrorrhagia)
• Retarded or excessively rapid foetal growth
Increased risks for the mother during delivery
• Delayed occurrence of foetal movements
• Movements infrequent and not clearly perceived by the mother (80 % of self-doubt)
• Poor foetal position
• Retarded growth
• Extensive oedema and sudden blurred vision
• Persistent, intense headaches
• Marked drop in amount of urine
• Persistent uterine contractions
• Abnormal vaginal discharge
• Absence of foetal movements over a 24-hour period beyond the 30th week of gestation
• Vaginal bleeding during the last three months
• Ruptured membranes and loss of fluid with or without fever before the 37th week of gestation
41

Figure 9 : Warning signals.

During pregnancy or when there is a presumption of pregnancy, use of certain vaccines should be avoided because of possible risks for the foetus. Vaccination with live vaccines is particularly contraindicated, except when there is a high epidemiological risk, as may be the case for yellow fever or polio (OPV), when the epidemic risk may outweigh the vaccinal risk. If necessary, inactivated vaccines (against influenza, rabies or diphtheria) may be administered.

Conversely, immunization against tetanus is highly recommended in countries where neonatal tetanus is a serious threat ; this protects both the unborn child and the mother.

No special precaution is required when vaccinating children or other people in contact with a pregnant woman : a child whose mother is pregnant may very well be vaccinated against rubella, for instance (see figure 9).

BIRTH

Birth will occur after 38 to 40 weeks (see table 2).

Birth makes special demands : there is great joy, and a feeling of tranquillity, but there are also moments of astonishment, at first meeting, and times when parents feel at a loss.

The little girl or boy is there, and the parents must learn to satisfy its needs, to savour its presence and accept its demands. Whenever possible, breast-feeding should be pursued. The baby imagined and dreamed of by the parents is now replaced by the real-life infant, who is now present. The mother's body changes, her breasts swell, her weight drops, her silhouette is no longer the same. The mother and her partner are obliged to transform the mental image they have of themselves. This is a complex adjustment process. The mother may sometimes feel sad or even depressed.

The fear of hurting the baby must be overcome, and the parents must learn to take care of it, to give it protection, pleasure, caresses, to speak to it. Thus, the baby will gradually, more easily become a part of the family group.

Table 2
Units for measuring gestation

Reference	Days	Weeks	Months	Lunar months
Fertilization*	266	38	8 3/4	9 1/2
Last menses	280	40	9	10

** The date of birth is estimated at about 266 days after fertilization or 280 days after the beginning of the last menses. From fertilization to the end of the embryonic stage, age is expressed in days. After that, age is usually expressed in weeks. Ovulation and fertilization take less than 12 hours, so that either of the two may be used to indicate prenatal age.*

The mother is the neonate's whole universe. During the gestation period, mother and baby form a single entity, or dyad which, although it changes qualitatively at birth, should be pursued through the first months of the baby's life. This dyad is the basis of an ideal bond between the two, which in turn will determine the quality of the infant's physical, mental and emotional development. Mothering further develops the intimate communication between mother and baby, begun when the baby was in the womb, or even before its conception. The woman's attentiveness to the gestation process, her ongoing emotional communication with her child, the support she received from her partner, her family and the health personnel all contribute to the relationship she establishes with the baby once they are face to face, skin against skin.

What do the mother and the baby experience during these first days of their life together, and what help do they expect ?

While in the womb, the foetus enjoys the security of a space in which all of its needs are met. Imagine the atmosphere in there : it is a nice, warm place, comforting and secure, in which movements are all gentle, sounds muffled, light subdued, but also, a space with well-defined boundaries. The mother is in a somewhat similar situation with respect to her baby : it is in her belly and she knows that while it is there it lacks nothing. Then the foetus begins to find the space in the uterus somewhat confined, and it is in possession of enough information about the outside world : it has felt its mother's hands, heard the sound of water running down into her belly, music, its father's voice, etc. It feels the desire to be born. At the same time, the mother is anxious to get to know her child, and feels the need for it to become real, a person to be touched, spoken to and hugged.

Birth and anxiety

At that point, mother and baby, in intimate communication, decide that the time for birth has arrived. This may cause some anguish for the mother, since childbirth means separation, whereas the two had become accustomed to being inseparable. The mother may feel too anxious to be able to face up to a natural delivery, and ask for anaesthesia or a Caesarean section although there is no need for either. Anaesthesia may deprive the mother of the psychologically beneficial experience of birthing : she then has a confused impression of the birth itself, and the newborn baby, too, will have its responses affected by the anaesthetics. This may well attenuate the first exchanges between mother and child, precisely at a time when they are essential for bonding. If the father and health personnel are supportive, and understand the expectant mother's anxiety, they may help her to decide to have a natural delivery.

The first interactions

Birthing is a strenuous experience for both mother and child, but then the baby is born, and enters a new, unknown world with all kinds of smells and sensations, and a very different atmosphere. The mother feels the need to get to know her baby, to have contact with it, to explore its hands and fingertips, to caress it and

speak to it. The baby answers, pays attention when touched, gazes at its mother, listens to her. This is the beginning of the mother-child relationship.

The presence of health workers and the attention paid by them to the mother's emotional experiences, as well as the father's support, all contribute to the child's reception and reassures it, making this extremely confusing moment a beneficial experience for all.

It is most important that the health personnel leave the baby with the mother immediately, at birth, and during the first hour. That precise moment is a very special time in the shaping of the mother/child dyad. There is an instinctive factor through which bonding occurs, and helps to create an intimate emotional relationship between mother and child. The various pieces of information about the baby should be given to the mother while the baby itself is right there next to her, discovering her smell, her skin, her voice and the sound of her heart. The newborn baby is in search of something to meet its needs, and that something is the breast, that will fill its hunger for food and love. When we refer to the breast, we are not simply speaking of a milk-secreting gland, but rather, about intimate skin contact, the way the mother takes her child in her arms, rocks it, giving it shelter, support and protection. The mother too has expectations and desires about this newly arrived child, to whom she will give care and attention.

During these first instants, mother and newborn seek each other out intensely, the latter discovers the mother's breast, while she is making an effort to identify this baby as the child she has been imagining for some months. Health workers may help the mother to take care of her newborn baby, and calm her apprehension about the problems encountered, and her fear of hurting it. It is important that the mother be reassured that she can turn to the health personnel and will receive help when needed.

One major responsibility of the health personnel is to give support for breast-feeding. Breast-feeding time is extremely important for both mother and baby, since they are in close, intimate contact. Once it has left the womb, the newborn makes contact with life and the world through the contact of its mouth with the breast. It wants food and receives it, but at the same time feels united with its mother, and feels loved. The suckling itself is reassuring, it calms the baby and sometimes accompanies it, as when it falls asleep.

EXAMINING THE NEWBORN BABY

On the day of birth

- Observe : postural symmetry, movement, muscle tone, grasping and responses
- Intensity and sound of crying
- Colour of the skin, buccal mucosa and nails
- Heartbeat : 120/160 beats/minute - strength
- Breathing : 40/60 per minute (periodicity, regularity, difficulty)

- Abdomen : softness

- External genitals and rectum (proper opening)

- Spinal column (the sacral region)

- Hips and feet - hands and fingers

- State of the skull, neck and mouth - eye examination

- Height, weight and head circumference (HC)

IMPORTANT : repeat measurement of HC the following day.

In short, make sure that the different parts function properly, that the transition from a liquid atmosphere to air went well, and that the child does not suffer from any anomaly (see table 3).

Table 3
Apgar system

Sign	Apgar score		
	0	1	2
Heartbeat	Absent	Fewer than 100 heartbeats/min.	Over 100 heartbeats/min.
Respiration efforts	Absent	Slow (irregular)	Strong sobbing
Muscle tone	Flaccidity	Slight bending of the limbs	Satisfactory motility
Reflex irritability	No response	Grimacing	Sneezing or coughing
Colour	Cyanosis, pallor	Body pink, acrocyanosis	All pink

Source : Apgar V , Anesth. Analg. (Cleve). 32, 260, 1953.

Other aspects requiring attention

- Keep the placenta and blood of problem newborns, for study if needed

- Maintain the skin protection afforded by the vernix caseosa (whenever possible)

- Prophylaxis of the eyes

- Strongly encourage immediate breast-feeding

- Early diagnosis of children with hypothyroid conditions or phenylketonuria

- Monitoring of acute or chronic infections

THE MOTHER AND THE POST-PARTUM PERIOD

- Give information on breast-feeding : its nutritive value and protection against infections

- Prevent risks of : haemorrhaging (anaemia) - infections (uterine, urinary) - thrombophlebitis - depression

- Mother's health after delivery : by the 3rd day milk production is already satisfactory, after 2 weeks the uterus has recovered its shape and size, after 6 to 8 weeks, menstruation resumes.

- Although the mother has completely recovered from her delivery 6 months later, it is wise, for her own health, that she not have another baby for 2 years. This means that she should be given information about birth control and family planning, since breast-feeding in itself is not a reliable contraceptive measure over the long term.

At-term, premature or late delivery

The at-term child

The at-term neonate is an immature child, from both the motor and social/psychological viewpoints, since its development is not finished at birth. As the years go by, it progresses, thanks to the support and stimulation received from the mother as well as from the family and social group. For decades, attention was only paid to the biological aspects of neonates. It is now clear that the newborn baby is a living being which, although extremely dependent, feels, sees, hears, tastes, has a memory, and is therefore capable of learning. There is no doubt that during the first months, the life of the newborn is composed of alternating periods of sleeping and wakefulness, interrupted by some periods of tension. This does not mean it is a passive creature : no, it is an active being, capable of expressing its needs (need to be fed, to be changed when wet, to be protected by clothing), and also capable of feeling human presence and contact and of participating more and more in the activities and life of the world around it.

The premature

Biologically speaking, any neonate whose gestation lasted less than 37 weeks is defined as a premature. But special attention should be paid to any neonate weighing less than 2,500 g, however long the gestation period. A neonate weighing over 2,500 g is viewed as premature if its gestation period lasted less than 37 weeks.

This is the case for twins, for example, and for children born in disadvantaged areas. These children require specific attention.

Postmaturity

Post-term babies generally have a normal height and head circumference, but have lost weight and are undernourished, as evidenced, mostly, by the appearance of the skin and the loss of subcutaneous fat.

BREAST-FEEDING*

Breast milk is the most complete and most appropriate food for infants. It is in adequation to the requirements of each moment, since its composition changes in the course of each feed and over time (with the child's age). During the first days after delivery it is called colostrum, and is particularly rich in proteins, minerals and immunoprotective substances. Several weeks after the beginning of milk secretion, its composition becomes more stable, but it still

* *Cf. «Children in the Tropics» n° 202/203 (1992), devoted to this subject.*

varies in the course of the day and even during a single feed, since it is more diluted at first and denser, with more fats, at the end, so that the child's appetite is controlled.

Breast milk is easy to digest and assimilate. It enhances the development of a well-balanced intestinal flora by stimulating the growth of the bifidus lactobacilli that participate in fermentation and play a major role in acidifying the digestive milieu and thus preventing the development of bacteria, molds and parasites. It also protects the baby against some kinds of infection through the presence of immunoprotective substances known as antibodies, secreted by the mother. Breast-feeding also makes the lips and jaws more active, since it takes a greater effort to suckle the breast than to suck the nipple of a baby-bottle.

Other advantages : breast-feeding is financially worthwhile, breast milk is naturally clean, available at all times and everywhere, and is always at the right temperature.

Conditions for successful breast-feeding

Every institution caring for mothers and newborns should :

1. Write down the golden rules of breast-feeding and systematically inform the health personnel of them.

2. Give the health personnel the training required to implement this policy.

3. Inform all pregnant women of the advantages of breast-feeding.

4. Help mothers, especially primiparas, to give the breast within a half-hour of childbirth.

5. Inform mothers of the practicalities, instruct them on how to conduct breast-feeding and how to maintain their secretion even if they are separated from their baby for several hours or even for 2 or 3 days.

6. Do not give neonates any food or drink other than breast milk, except on medical prescription.

7. Leave the baby with its mother 24 hours a day.

8. Gradually habituate the baby to demanding the breast.

9. Do not give a breast-fed infant any comforter or other object to suck.

10. Encourage the creation of associations supporting breast-feeding, and talk with mothers about this before they leave the maternity hospital.

Advantages for the mother

Aside for the many advantages of breast-feeding for the infant, there are also many advantages for the mother :

- it reinforces her self-esteem and strengthens her pride in offering health and life to another human being ;

- during the post-partum phase, it helps the uterus return to its normal size ;

- it reduces the risk of cancer of the breast or uterus ;

- it helps to overcome the risk of depression, since it plays a role in reducing hormone production and contributes to a harmonious balance between the physical and psychological elements of the post-partum period ;

- exclusive breast-feeding delays ovulation and the resumption of the menstrual cycle. In itself, though, it is not sufficiently reliable to be counted on to avoid another pregnancy, and should therefore be completed by another contraceptive technique ;

- it helps the woman to recover her pre-pregnancy weight and reduces the fat deposits in the breast tissue. The idea that «women who breast-feed have sagging breasts» has never been scientifically proved.

Breast-feeding is an important part of motherhood, and builds the mother/child dyad on a solid basis, one that may include the father if he supports this process.

The decision to breast-feed is an important one for both mother and child ; some women may experience difficulties during breast-feeding which lead them to abandon it. The first thing to do in order to cope with breast-feeding without fear or anguish is to consult the health personnel, the family or friends as soon as the first difficulties arise. This should be a time rich in satisfactions and positive emotions for both mother and baby, rather than an obligation associated with the widespread notion that «if you don't breast-feed you are not a good mother».

THE HEALTH TEAM - AN INTERDISCIPLINARY TEAM

The health team is usually composed of professionals directly involved in providing care for expectant mothers and their baby, and may include a midwife, nurse's aid, general practitioner or gynaecologist-obstetrician. Many other people may participate in accompanying and supporting the mother during pregnancy, however. This is the case of health promoters, teachers and educators, traditional midwives, social workers, laboratory workers, administrators of health institutions, physical therapists, nutritionists, dentists, psychologists, public health physicians, family doctors, paediatricians, etc. All of these specialists should be committed to contributing, as effectively, humanely and generously as possible, since pregnancy is both a personal event and one that is shared by the couple as well as by the people in close contact with them.

EDUCATION AND PREGNANCY

During pregnancy, antenatal visits provide an opportunity to inform mothers, and to respond to their explicit and unformulated questions and expectations. The elements of surveillance of the mother, the pregnancy and overall foetal development are presented below.

First three months
Early diagnosis
Medical check-up
Social/psychological aspects
Relations with the family
Surveillance of pregnancy - diet
Malaises during pregnancy
Danger signs and symptoms
Immunization

Second three months
Preparation for breast-feeding
Relations with the family
Information on diet
Danger signs and symptoms
Immunization
Antenatal monitoring
Social and psychological support
Importance of breathing properly
Child nursing
Sleep and rest

Last three months
Antenatal monitoring
Breast-feeding
Preparation for delivery
Immunization
Psychoprophylaxis
Care for the newborn
Planned parenthood
Post-partum care

Vaccination against tetanus involves two doses one month apart, at any point in pregnancy.
Figures 10, 11 and 12 show the work of the health personnel throughout the pregnancy period.

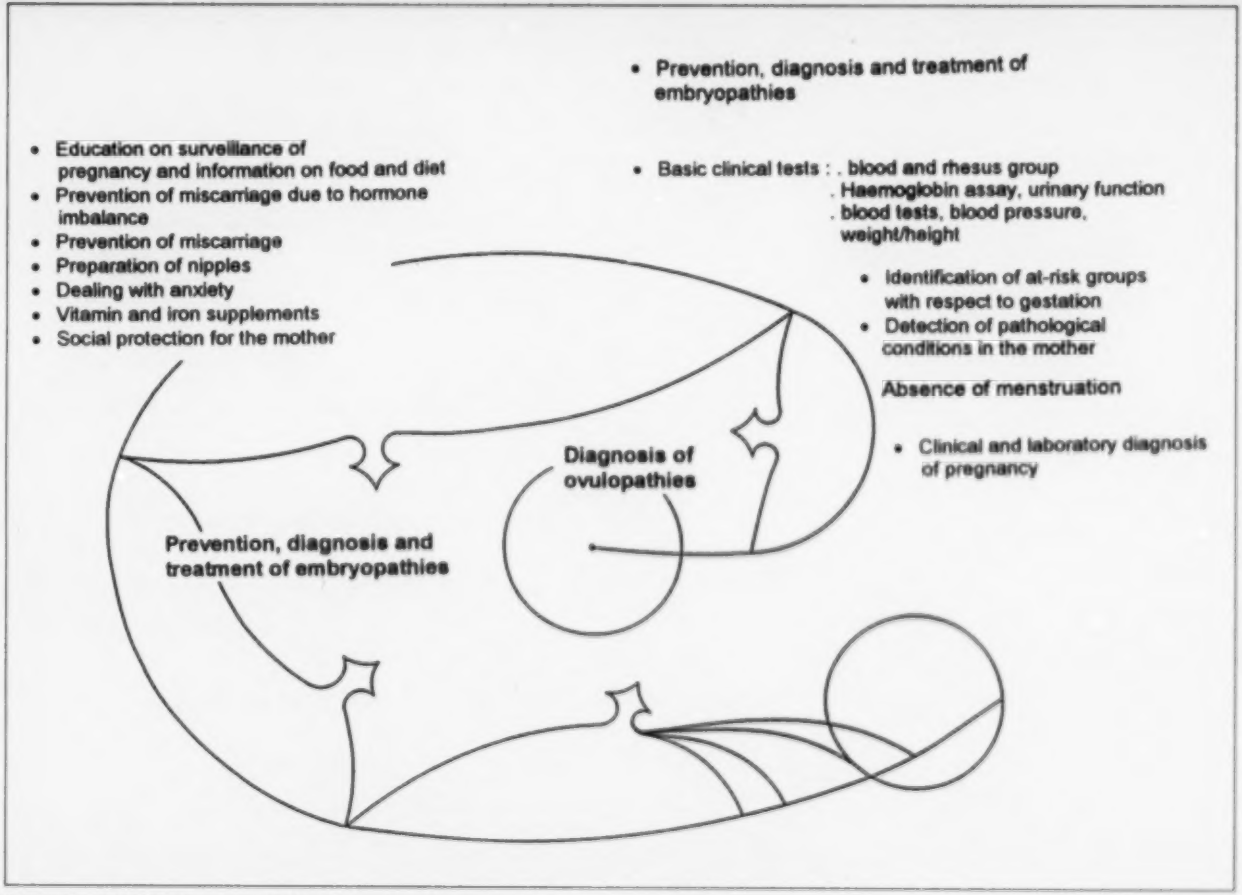

• Prevention, diagnosis and treatment of embryopathies
• Education on surveillance of pregnancy and information on food and diet
• Prevention of miscarriage due to hormone imbalance
• Prevention of miscarriage
• Preparation of nipples
• Dealing with anxiety
• Vitamin and iron supplements
• Social protection for the mother
• Basic clinical tests : . blood and rhesus group
. Haemoglobin assay, urinary function
. blood tests, blood pressure, weight/height
• Identification of at-risk groups with respect to gestation
• Detection of pathological conditions in the mother
Absence of menstruation
• Clinical and laboratory diagnosis of pregnancy
Diagnosis of ovulopathies
Prevention, diagnosis and treatment of embryopathies

Figure 10 : Health team : tasks during the embryonic period.

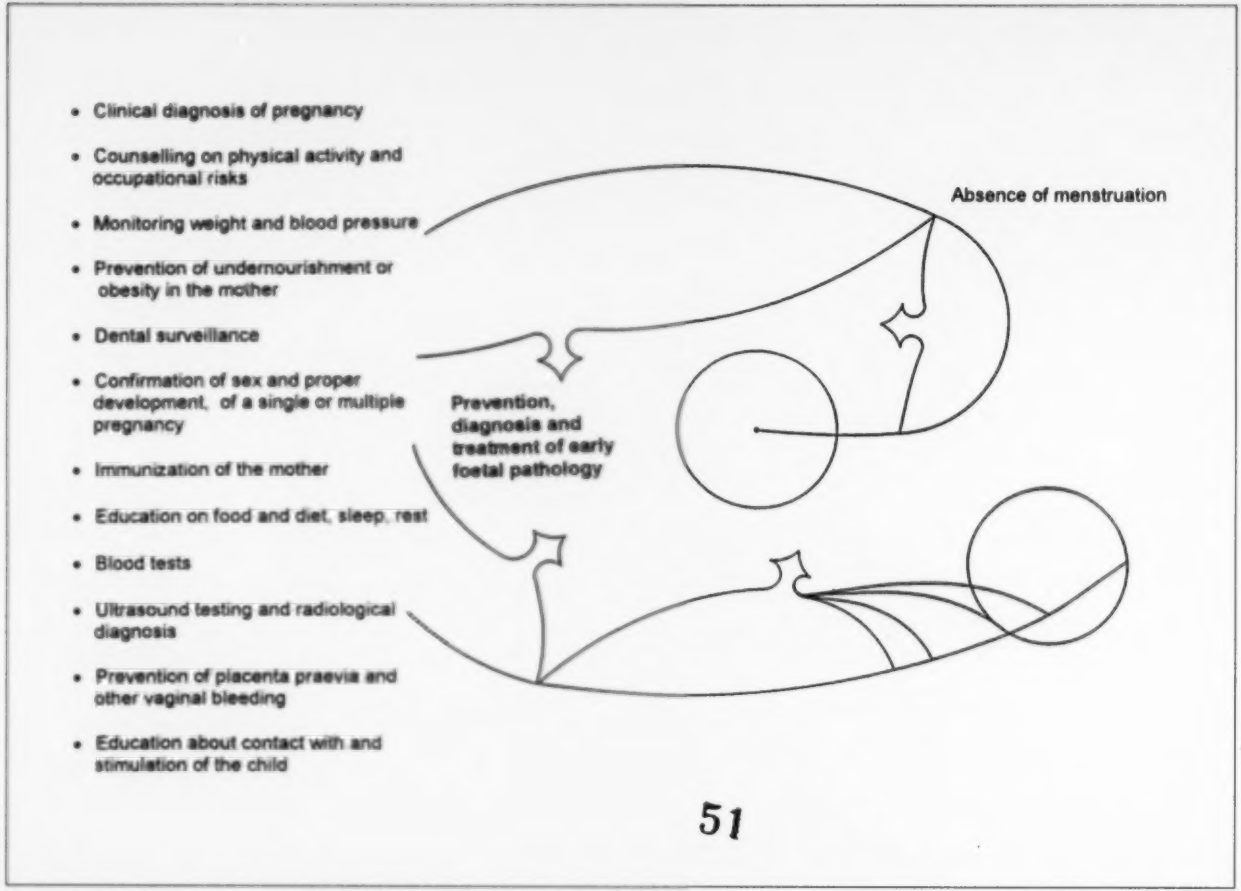

Clinical diagnosis of pregnancy
Counselling on physical activity and occupational risks
Monitoring weight and blood pressure
Prevention of undernourishment or obesity in the mother
Dental surveillance
Confirmation of sex and proper development, of a single or multiple pregnancy
Immunization of the mother
Education on food and diet, sleep, rest
Blood tests
Ultrasound testing and radiological diagnosis
Prevention of placenta praevia and other vaginal bleeding
Education about contact with and stimulation of the child
Absence of menstruation
Prevention, diagnosis and treatment of early foetal pathology
51

Figure 11 : Health team : tasks during the foetal period.

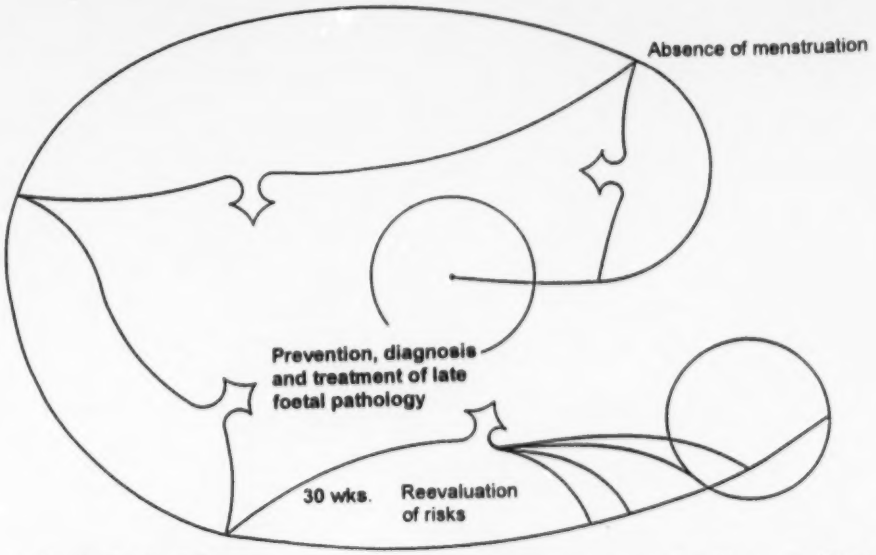

Absence of menstruation
Prevention, diagnosis and treatment of late foetal pathology
30 wks.
Reevaluation of risks
• Preparation for delivery
• Prevention of prematurity
• Monitoring blood pressure and checking for oedema
• Assessment of the pelvis
• Prevention and treatment of problems during delivery
• Surveillance of delivery
• Prevention of toxaemia
• Care for the neonate
• Education on child development and immunization
• Prevention of post-maturity
52

Figure 12 : Health team : tasks during the late foetal period and immediately after birth.

A number of biological tests should be performed, and information dispensed, at different points in pregnancy in accordance with the locally available resources.

LABORATORY TESTS AND EDUCATIONAL THEMES

First three months
Haematocrit
Serology
Blood group
Glycaemia
Vaginal smear
Education on the prenatal phase, lactation, diet, immunization

Second three months
Haemoglobin
Haematocrit
Urine tests
Education on the prenatal phase, lactation, diet, immunization

Last three months
Haemoglobin
Haematocrit
Serology
Urine tests
Vaginal smear
Education on birthing, the post-partum period, lactation, immunization

The number of visits recommended depends on the country and level of development of its health services. Table 4 shows a chronogramme for these visits. Table 5 deals with at-risk women.

Table 4
Chronogramme of visits and levels of responsibility for different risks

Visits	1st	2nd	3rd	4th	5th	6th
Gestational age (weeks)	< 20	22-25	26-30	31-35	36-38	39-41
Personnel	Physician	Nurse	Nurse	Nurse	Physician	Physician

If danger signs are present, the nurse (or midwife) should refer the woman to a physician.

Table 5
The at-risk pregnant woman

Visits	1st	2nd	3rd	4th	5th	6th	7th
Gestational age (weeks)	< 20	22-24	25-28	30-32	34-36	37-39	40-41
Personnel	Physician	Gynaecologist/ obstetrician	Physician	Physician	Gynaecologist/ obstetrician	Gynaecologist/ obstetrician	Gynaecologist/ obstetrician

The gynaecologist obstetrician will set the number and timing of antenatal monitoring visits as well as the capacity of the person in charge of them.

These chronogrammes do not consider other professionals such as psychologists, dentists, social workers, physical therapists or auxiliaries. All of the latter may be called upon at certain points in the pregnancy, when geographically and economically feasible.

CONCLUSION

The above educational tool has undergone testing and evaluation. Here is a rapid analysis of the main reactions.

Users of the method found it valid and extremely useful ; it makes a new contribution to surveillance and places emphasis on some otherwise known information. No negative responses were recorded ; some people mentioned the originality of the method. It was used on future fathers, and motivated and encouraged them to give support to their wives during pregnancy.

It is a valuable aid in detecting risks, thus encouraging a preventive attitude. It even produced some changes in attitudes towards undesired pregnancies.

The motivation of expectant mothers has been shown to be improved by repeated use of this tool in the course of antenatal surveillance.

It acts as a guide for health personnel in that it furnishes the technical explanations required to understand and help these women.

It helps to point out insufficient weight gains in pregnant women : when properly used, the nomogramme is an excellent complement to other charts already in use, such as the chart developed by the CLAP (Montevideo).

Some trials directed at health promoters and groups of pregnant adolescents have proved encouraging. This tool has also been tested on health promoters who were pregnant themselves, nurses' aids, nurses, physicians and psychologists, with encouraging results. Their reactions led to further improvement of the efficacy of the tool.

Suggestions

Some suggestions were formulated by the users of this document :

- it should be completed by a booklet of instructions containing basic information for health workers, outlining the purpose of its overall design and showing how it may be applied to pregnant women. It would be a good idea for them to have some pieces of information, and the diagrams in particular, constantly visible ;

- the trials already carried out should be repeated, and this document should be recommended for use in psychoprophylaxis sessions, with groups of five or six expectant mothers. The advantages of use of this document in antenatal consultations should be clarified and the achievements with respect to low birth weight babies quantified ;

- include some messages on planned parenthood ;

- reinforce the messages about psychological and social support ;

- make a clear distinction between messages aimed at mothers and calls for watchfulness aimed at health workers, using a colour-signal system ;

- place greater emphasis on child (embryonic - foetal) development, perhaps week by week ;

- include warnings about organic and functional problems ;

- include two figures, one on the path travelled by the ovum from the ovary to the uterus and another on the actual relationship between the foetus and the mother's body during the last weeks before delivery ;

- develop use of the document in an educational perspective, experiment with using it before pregnancy, and on groups of adolescent girls, so that it may become a tool for the prevention of pregnancy-linked risks of maternal and infantile mortality ; use it during the first and second trimesters in a preventive and educational perspective, and during the last three months to provide psychoprophylactic support and to prepare for birthing.

APPENDIX

PHARMACEUTICALS AND PREGNANCY

From the third week after conception on to the end of pregnancy, medication taken by the mother may be harmful to the foetus. During the first week after conception, before the embryo is embedded, it is probable that potentially harmful pharmaceuticals have an «all or nothing» effect, meaning that either the embryo dies or the injured cells are replaced by undifferentiated cells that end up developing normally. Once the embryo is implanted, differentiation begins and continues during the next eight weeks. Damage during this period of organogenesis (from the third to the eleventh week of gestation) generates congenital malformations. During the subsequent phases, the chances of development of serious malformations are slight, but pharmaceuticals may still impede the growth and functional development of the foetal tissues and organs.

PHARMACEUTICALS THAT MAY BE HARMFUL TO THE FOETUS DURING THE FIRST THREE MONTHS

DRUGS	REMARKS
Proved teratogenic agents	
Thalidomide Cytotoxic agents	Major risk with folic acid antagonists (Methotrexate) and alkylating agents such as busulfan and cyclophosphamide. Minor risk with others.
Probable teratogens	
Alcohol (chronic alcohol abuse) Phenytoin, trimethadione Lithium - Warfarin Quinine (high doses)	
Live virus vaccines	Vaccination generally induces viraemia, and the virus may be detected in the foetus.
Possible teratogens	
Oestrogens, progestational hormones	Administered to avoid miscarriages. Hormonal pregnancy tests. Oral contraceptives.

PHARMACEUTICALS	POSSIBLE EFFECTS
Barbiturates, primidone Operating room atmosphere (volatile anaesthetics) Trimethoprime (cotrimoxazole), pyrimethamine	The risk is purely theoretical in the case of folic acid antagonists.
Other effects	
Androgens, oestrogens, progestational hormones	These may cause virilization of the female foetus. Low doses of oral contraceptives probably do not produce this effect.
Ethinyl estradiol	Daughters of women who took large doses of this hormone are known to have developed a vaginal carcinoma 15 to 20 years later.
Radiological diagnosis	Increased risk of leukaemia and other neoplasms

PHARMACEUTICALS PRODUCING UNDESIRABLE EFFECTS ON THE FOETUS DURING THE SECOND AND THIRD TRIMESTERS

PHARMACEUTICALS	POSSIBLE EFFECTS
Tetracyclines	They are deposited on the developing bones and teeth, producing spotting on the milk teeth when taken after the 14th week ; the permanent teeth are affected during the last three months of gestation.
Aminoglycosides - Streptomycin Gentamycin - Tobramycin Kanamycin	May damage the auditory and vestibular nerves, although serious damage is apparently exceptional.
Diuretics (thiazides)	May induce neonatal thrombocytopenia when administered during the last three months.
Diazoxide	Prolonged use induces diabetes in the foetus.

Iodides (including cough medicine), antithyroid agents	May cause goitre in the foetus and neonatal hypothyroidism. As a rule, their effects are minimal and transient, but it is wise not to administer antithyroid agents during the last 4 months of pregnancy.
Radioactive iodine	May damage the foetal thyroid and cause permanent hypothyroidism.
Lithium	Cases of neonatal goitre have been reported.

PHARMACEUTICALS WITH UNDESIRABLE EFFECTS ON THE NEONATE WHEN ADMINISTERED SHORTLY BEFORE DELIVERY

PHARMACEUTICALS	UNDESIRABLE EFFECTS
Oral anticoagulants	Possible foetal or neonatal haemorrhaging. Anticoagulants should be replaced by heparin during the last three weeks of pregnancy.
Aspirin	The usual doses interfere with platelet functioning and larger doses may cause hypoprothrombinaemia. Neonatal bleeding is a possibility, and for this reason it is preferable not to take aspirin during the last weeks of pregnancy.
Phenytoin Phenobarbital	Inhibits the synthesis of coagulation factors, which require vitamin K. There is a risk of neonatal bleeding, that may be avoided by administering vitamin K1 to the neonate.
Reserpine	Bradycardia, nasal congestion and drowsiness.
Propranolol, oxprenolol	May induce or aggravate neonatal hypoglycaemia. Cases of foetal or neonatal bradycardia have been documented.
Sulfonylureas such as chlorpropamide and tolbutamide	Risk of neonatal hypoglycaemia. The pregnant woman should interrupt intake of oral antidiabetic agents at least 3 days before delivery.
Analgesics, narcotics	Depress breathing in the neonate. A «withdrawal» syndrome may be observed in babies born to drug-dependent mothers.

Hypnotics and sedatives	May depress breathing in the neonate.
Barbiturates	A «withdrawal» syndrome may occur in the neonate born to a mother who took barbiturates regularly during the last three months of her pregnancy.
Diazepam	Hypotonia and hyperthermia in the neonate when large doses (exceeding 30 mg) are administered during delivery.
Phenothiazines	Extrapyramidal effects have been reported in neonates.
Lithium	Risk of hypotonia, cyanosis and bradycardia, even if the concentration of lithium in the mother's blood is monitored.
Alcohol	A «withdrawal» syndrome has been observed in the offspring of alcohol-abusing mothers.
Anaesthetics	Depress breathing in the neonate.
Local anaesthetics, bupivacaine	Following epidural anaesthesia, foetal or neonatal bradycardia may occur.
Neostigmine	Large doses occasionally induce neonatal myasthenia.
Chloramphenicol	Circulatory collapse due to immaturity of the neonate's hepatic conjugation enzymes.
Sulfamides - Aspirin Tolbutamide - Indomethacin Vitamin K-like substances such as menadione	Remove unconjugated bilirubin from binding points with proteins. Increase the risk of nuclear jaundice, especially in prematures.
Sulfamides - Nitrofurantoin Primaquine - Phenacetin Synthetic vitamin K-like substances	May cause haemolytic anaemia. Severe haemolysis compounds the risk of nuclear jaundice.

PHARMACEUTICALS SUSCEPTIBLE OF DISTURBING LABOUR

PHARMACEUTICALS	UNDESIRABLE EFFECTS
Diazoxide	Inhibits uterine activity, possibly inducing temporary interruption of contractions during delivery.
Aspirin, indomethacin	May delay the onset of labour, and prolong it, by inhibiting prostaglandin synthesis. Other analgesic anti-inflammatory agents may be used to the same effect.
Beta-adrenergic stimulants such as salbutamol, orciprenaline, terbutaline	Salbutamol and orciprenaline are administered parenterally to delay premature delivery. There is a possibility that large doses administered parenterally or orally to combat asthma may delay the onset of labour. They may induce hyperglycaemia in diabetic women.

PHARMACEUTICALS WITH UNDESIRABLE EFFECTS ON EXPECTANT MOTHERS

PHARMACEUTICALS	UNDESIRABLE EFFECTS
Lithium	Larger doses may be called for during pregnancy owing to increased renal evacuation. Toxic symptoms may develop if the dose is not reduced following childbirth.
Tetracyclines	Large intravenous doses (over 1 g/day) occasionally induce severe liver damage.
Analgesics, narcotics	Cause gastric stasis and increase the risk of pneumonia through aspiration during labour.

SMOKING AND PREGNANCY

Smoking during pregnancy reduces birth weight and increases perinatal mortality. Several studies document increased risk of miscarriage.

PHARMACEUTICALS AND BREAST-FEEDING

Almost all of the medications taken by a lactating woman cross over into the milk, although the amounts are too low, as a rule, to affect the suckling child. Nonetheless, when the mother takes medication on a regular basis there may be an accumulation in the neonate, culminating in concentrations that suffice to induce disorders.

The substances listed here are excreted in the breast milk in amounts sufficient to generate undesirable effects in the baby : in some cases, proof is available.

A complete list cannot be established, for lack of sufficient information, and it is preferable to avoid breast-feeding if the mother is absolutely obliged to take drugs that are potentially harmful for her baby during the post-partum period.

PHARMACEUTICALS	UNDESIRABLE EFFECTS ON NEONATES AND INFANTS
Alcohol	Large quantities may affect the infant.
Aminophylline	Breast-fed infants whose mother was taking 200 mg of aminophylline every six hours have been reported to be somewhat irritable. The mother should take the medication shortly after giving the breast, to avoid high concentrations in her milk.
Anticonvulsants : Carbamazepine, Phenobarbiturates, Phenytoin, Primidone	Possible drowsiness in the neonate.
Antithyroid agents : Carbimazole, Benzylthiouracils, Radioactive iodine	Hypothyroidism and goitre
Laxatives containing anthracene	Stimulates intestinal activity
Aspirin	Large doses may reduce platelet activity and cause hypoprothrombinaemia if the neonatal vitamin K reserves are low. If the mother takes aspirin immediately after giving the breast the effect may be less serious.

Anticoagulants	With phenindione and ethyl biscoumacetate, there is a risk of bleeding. Warfarin seems to be harmless, but it is preferable to administer vitamin K1 to the infant. Heparin is not excreted in the breast milk.
Barbiturates	Large doses may induce drowsiness.
Bromides	Rashes and drowsiness.
Chlorpromazine	Cases of drowsiness have been reported.
Chloramphenicol	Gray syndrome. Risk of medullar aplasia.
Chloral hydrate, dichloralphenazone	Drowsiness.
Steroid hormones	Prolonged administration of therapeutic doses may cause neonatal suprarenal insufficiency.
Cytotoxic agents	Almost all entail a risk of toxicity. Neutropenia in breast-fed infants following maternal intake of cyclophosphamide has been documented.
Diamorphine	Regular use may cause addiction and a «withdrawal» syndrome in the child.
Diazepam, nitrazepam (and perhaps other benzodiazepines)	Diazepam causes drowsiness, lethargy and arrested growth. Constant use of large doses should be avoided, but it is improbable that occasional ingestion is harmful.
Ergotamine	Ergotism : vomiting, diarrhoea, convulsions, circulatory disorders.
Gold salts	Theoretically potentially toxic.
Iodides (including cough medicine)	Hypothyroidism and goitre.

Isoniazid	Hypothetical risk of convulsions and neurological disorders.
Lithium	The amounts found in breast milk are susceptible of affecting the child, but the risk of toxic effects such as hypotonia and lethargy is probably low if the mother's blood concentrations are properly monitored. Many women who take lithium have suckled their babies without experiencing complications, but bottle-feeding is preferable.
Meprobamate	Drowsiness.
Nalidixic acid	Cases of haemolytic anaemia have been reported in children whose mother had taken nalidixic acid during the lactation period.
Oral contraceptives	If the dose of oestrogen does not exceed 50 microgrammes the probability that the infant will be affected or that it will be necessary to end breast-feeding is slight. Some writers advise not to use contraceptives until milk production is completely stable, which is to say six weeks after childbirth.
Penicillin	The amounts crossing over into the milk are minute, but may induce hypersensitivity.
Propanolol	Folate deficiency. The infant may receive therapeutic doses, depending on the amounts taken by the mother. There is a risk of bradycardia and hypoglycaemia.
Pyrimethamine	If the mother takes doses exceeding 50 mg, the milk contains sufficient amounts to protect the child against malaria.
Sulfamides	One case of haemolytic anaemia in a child with glucose-6-phosphate dehydrogenase deficiency has been reported.
Tetracyclines	Cross over into the milk, but chelation with the calcium in milk possibly prevents uptake by the infant.
Tolbutamide	Hypothetical risk of neonatal hypoglycaemia.
Diazoxide - Erythromycin Lincomycin - Metronidazole Novobiocine - Trimethoprim Thiazide diuretics	All are found in large amounts in breast milk, but no adverse effects have been reported.

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STEPS IN INTRAUTERINE DEVELOPMENT

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There are many programmes, coming with methodological handbooks, that deal with surveillance of expectant mothers or of the physical and psychomotor development of children during the early years of life. Few provide landmarks for following both mother and child during the prenatal period.

The authors of the present document, a Colombian/Spanish team, focus on this period and show what should be done, not only for the expectant mother but for the mother-child dyad as well, with special emphasis on how communication is established between mother and child, the interactive relationship between the two, and the importance of the father's role.

This dossier, developed by a multidisciplinary team, is designed for parents as well as for health workers. It is the fruit of much action-research and experimentation, and the development of the method went through a number of phases before the latter was ready to be diffused.

"A little girl washing her clothes". Picture by Doctor Anne TURSZ (Udaipur, India).

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